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COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
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VOL. XXXIII AUGUST 1954

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PETRAK (F.). **Neue Beiträge zur Pilzflora der Türkei.** [New contributions to the fungus flora of Turkey.]—*Sydowia*, 7, 1–4, pp. 14–44, 1953.

This critically annotated list of additions to the mycoflora of Turkey [cf. *R.A.M.*, 27, p. 349; 29, p. 335, *et passim*] comprises, *inter alia*, 19 new species (including *Septoria adanensis*), seven new combinations, and the following records of special interest: *Tilletia hordei* on *Hordeum* sp. [8, p. 339], *Puccinia decipiens* on *Taraxacum koksaghyz*, *P. junci* and *Stagonospora vexata* on chicory, *Uredo ravennae* (mostly parasitized by *Darluca filum*) on *Erianthus ravennae*, *Haplosporella mali* [*Physalospora obtusa*: 15, p. 31] on apple, *Plenodomus* [*Phoma*] *lingam* on *Raphanus raphanistrum*, and *Septoria carthami* on safflower [27, p. 383].

S. adanensis, forming confluent, irregular, dark olivaceous to nigrescent lesions, 2 to 6 or rarely up to 8 mm. in diameter, on living foliage of *Chrysanthemum indicum*, differs from other *S.* spp. on the same host in its much smaller pycnidia (50 to 60 μ in diameter) and conidia (23 to 35 or occasionally up to 40 by 1·5 to 2 μ).

PETRAK (F.). **Beiträge zur Pilzflora Afghanistans.** [Contributions to the fungus flora of Afghanistan.]—*Sydowia*, 7, 1–4, pp. 84–97, 1953.

Included in this critically annotated list of fungi recently collected in Afghanistan are three new species and a new combination. *Puccinia menthae* is recorded on the stems and leaves of *Mentha longifolia* [*R.A.M.*, 31, p. 351; C.M.I. map No. 211].

RAMAKRISHNAN (T. S.) & SUNDARAM (N. V.). **Notes on some fungi from South India—I.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 110–115, 1 pl., 1953.

This annotated list includes one new species, one new variety, and, *inter alia*, *Phyllachora sorghi* which caused a heavy infection on the leaves of a number of sorghum varieties, *Sorghum dochna* var. *irungu*, *S. roxburghii*, *S. durra* var. *coimbatoricum*, *S. margaritiferum*, *S. elegans*, *S. conspicuum*, Johnson grass, and some hybrid progenies, in and around Coimbatore in January, 1953.

THIRUMALACHAR (M. J.) & MISHRA (J. N.). **Contributions to the study of fungi of Bihar, India—I.**—*Sydowia*, 7, 1–4, pp. 79–83, 1 pl., 1953.

One new genus, *Biharia*, and four new species are described in this annotated list of 26 fungi from Bihar, India [cf. *R.A.M.*, 33, p. 338 and next abstract], which also records *Cercospora corchori* on jute (*Corchorus olitorius*) [27, p. 524], *Cercospora hibisci* [30, p. 389] on *Hibiscus rosa-sinensis*, *C. solani-tuberosi* on potato, *Claviceps microcephala* on *Echinochloa crusgalli*, *Sorosporium paspali* var. *verrucosum* on *Paspalum scrobiculatum* [cf. 26, p. 421], and *Physoderma maydis* on maize [33, p. 235].

THIRUMALACHAR (M. J.) & GOVINDU (H. C.). **Notes on some Cercosporae of India —II.**—*Sydowia*, 7, 1–4, pp. 45–49, 2 figs., 1953.

Included in this further annotated list of 13 *Cercospora* spp. (11 new) from India (cf. *Mycologia*, 40, pp. 352–362, 1948) [see preceding abstract] are *C. canavaliae* on *Canavalia ensiformis* and *Cercospora moringae* n.sp., forming circular to polygonal, often coalescent, greyish-brown lesions on the foliage of *Moringa oleifera* and characterized by pale olivaceous-brown, simple, one- to three-septate conidiophores, 21·5 to 42·5 by 4 to 7 μ, and concolorous, subhyaline, cylindro-obclavate conidia, 25·5 to 50 by 4 to 8 μ.

LING (L.). **The Ustilaginales of China.**—*Farlowia*, 4, 3, pp. 305–351, 4 pl., 1953.

Some of the species in this systematic list (with keys) of over 100 Ustilaginales of China [*R.A.M.*, 16, p. 840; 33, p. 321] were included in the author's previous publication [28, p. 595]. Among the remainder may be mentioned *Ustilago bullata* on *Bromus unioloides*, *U. crusgalli* on *Echinochloa crusgalli*, *U. heufleri* (syn. *U. tulipae*) on *Tulipa edulis*, *U. maydis* on maize [C.M.I. map No. 93], *U. striiformis* [*R.A.M.*, 33, p. 359] on *Hierochloe glabra*, *U. violacea* [30, p. 468] on *Dianthus superbus* and two species of *Silene*, *Sphacelotheca destruens* on *Panicum miliaceum* [C.M.I. map No. 219], and *S. sorghi* [No. 220] and *Tolyposporium ehrenbergii* on sorghum.

FISCHER (G. W.). **Manual of the North American smut fungi.**—xii+343 pp., 136 figs., New York, The Ronald Press Company, 1953. $8.75.

In this comprehensive handbook are described 276 species of the Ustilaginales [*R.A.M.*, 31, p. 401; 33, p. 116 and preceding abstract] arranged alphabetically under 22 genera and under species. It includes a combined key and host genus index and species keys. Many of the species are well illustrated by photographs of the habit and spores of type specimens. The book is designed to facilitate the rapid identification of any of the known North American species of smuts. Amplified descriptions, based on the author's observations, are given in many instances where the original description was deficient. One new species is described.

HAGEN (A.). **Neue Beiträge zur arktischen Pilzflora.** [New contributions to the Arctic fungus flora.]—*Ber. dtsch. bot. Ges.*, 65, 4, pp. 96–99, 1952.

Included in this annotated list of fungi collected in Greenland are *Rhytisma salicinum* on *Salix glauca* [cf. *R.A.M.*, 15, p. 259]; *Sphaerotheca fuliginea* [cf. 32, p. 466] on a new host, *Pedicularis labradorica*; *Chrysomyxa empetri* [16, p. 647] on *Empetrum hermaphroditum*; *Gymnosporangium juniperi* [cf. 32, p. 421] on *Sorbus scopulina*; *Melampsora arctica* [27, p. 207] on *Saxifraga oppositifolia*; *Puccinia poae-nemoralis* [32, p. 193] on *Anthoxanthum odoratum*, a new host for Greenland; and *Ustilago violacea* on *Silene acaulis*.

OVERHOLTS (L. O.). **The Polyporaceae of the United States, Alaska, and Canada.**—*Univ. Michigan Stud.*, 19, xiv+466 pp., 132 pl., Ann Arbor, University of Michigan Press; London, Geoffrey Cumberlege, 1953. $7.50 (60*s.*).

After a review of the history of the family Polyporaceae and its economic importance a key is given to the eight included genera, *Fomes*, *Lenzites*, *Cyclomyces*, *Daedalea*, *Hexagona*, *Trametes*, *Favolus*, and *Polyporus*. Descriptions and keys are given of 235 species, including notes on their distribution, relationships with other species, and types of decay caused. The work is beautifully illustrated with 124 photographic plates of sporophores, the remaining seven plates showing microscopic hymenial characters of various polypores. Systematic treatment is on the whole conservative: three new combinations are made, *Ganoderma applanatum* is included in *Fomes*, and *Polystictus abietinus* in *Polyporus*. There is a comprehen-

sive bibliography covering 238 titles. The book has been prepared for publication by Prof. J. L. Lowe.

ETCHELLS (J. E.), BELL (T. A.), & JONES (I. D.). **Morphology and pigmentation of certain yeasts from brines and the Cucumber plant.**—*Farlowia*, 4, 3, pp. 265–304, 16 col. pl., 109 figs., 1953.

This contribution from North Carolina Agricultural Experiment Station, a preliminary account of which has already been noticed from another source [*R.A.M.*, 30, p. 59], falls into three major parts: film-forming brine yeasts, subsurface brine yeasts, and yeasts from the cucumber plant, the last-named incorporating recent unpublished studies.

Certain yeast species associated with meat brines are also illustrated.

LYLE (J. A.). **A comparative study of Sclerotium rolfsii Sacc. and Sclerotium delphinii Welch.**—*Diss. Abstr.*, 13, 5, p. 611, 1953. [Mimeoprinted. Received April, 1954.]

Comparative studies at the University of Minnesota indicated that *Sclerotium rolfsii* [*R.A.M.*, 32, p. 341; 33, p. 184] must be considered as a species comprising an indefinite number of biotypes, since all the 51 single-basidiospore isolates studied differed from each other in at least one respect. The inclusion of what has been considered previously as *S. delphinii* [31, p. 554] does not require an expansion of the specific limits of *S. rolfsii*. Thirty-two single-basidiospore isolates all produced basidiospores, indicating homothallism. Nine mutants observed in the many hundreds of *S. rolfsii* cultures and three in those of *S. delphinii* had lost the ability to produce sclerotia.

THIRUMALACHAR (M. J.). **Pycnidial stage of charcoal rot inciting fungus with a discussion on its nomenclature.**—*Phytopathology*, 43, 11, pp. 608–610, 4 figs., 1953.

At the Central Potato Research Institute, Patna, Bihar, India, isolates of *Macrophomina phaseoli* [see above, p. 446] from jute, potato, maize stalks, garlic, castor [*Ricinus communis*: see above, p. 447], and *Solanum nigrum*, all affected by charcoal rot [*R.A.M.*, 33, p. 116], could be placed in two groups, corresponding to Reichert and Hellinger's subspecies *typica* and *sesamica* [28, p. 85], the latter being isolated from potato, maize kernels, and castor. Isolates from all the above-mentioned hosts and sunn hemp [*Crotalaria juncea*] induced typical charcoal rot symptoms in Darjeeling Red Round potato tubers within four days at 28° C. provided the inoculum was taken from young, vigorously growing cultures; older ones, in which sclerotial development had already started, failed to bring about infection. Thus, the age and condition of the culture should be considered in the differentiation between pathogenic and non-pathogenic strains of the fungus. Inoculated into stems of potato plants at 28° to 35° the various isolates produced the pycnidial state within a week, and it developed in cultures of one of the maize strains, the pycnidia arising from persistent, smokey grey, concentrically zonate mycelium of the *sesamica* type [cf. 26, p. 139].

The suggestion of Hoffmaster *et al.* that the sclerotia of *M. phaseoli* may represent immature pycnidia was not confirmed by the present studies, from which the author concludes that the pycnidial state hitherto classified as *M. phaseoli* belongs to the genus *Botryodiplodia*, to which it is accordingly transferred.

DOGUET (G.). **Variation de la longueur des spores chez le Trichothecium roseum (Pers.) Link.** [Variation in spore length in *Trichothecium roseum* (Pers.) Link.] —*Bull. Soc. bot. Fr.*, 100, 7–9, pp. 298–301, 2 graphs, 1953.

When *Trichothecium roseum* [cf. *R.A.M.*, 9, p. 262; 28, p. 347; 31, p. 571]

isolated from apple was grown on Sabouraud's agar at 22° C. spores 0, 5, 10, 15, 20, 25, 30, 35, and 40 mm. distant from the centre of the culture along any radius averaged 12·7, 14·8, 15·7, 15·4, 14·7, 14·4, 14·1, 13·8, and 13·4 μ long, respectively, the measurements being made from the 22nd to the 29th day after inoculation. It was near the points where the longest spores were found, 7·5 to 10 mm. from the centre, that the first spores developed and later the greatest numbers were found. The longest and the smallest spores could be found anywhere, and width was about the same in all cases (9 to 22 μ).

Alcaraz-Mira (E.). **Tobacco mosaic resistance in Spain.**—*Science*, 119, 3087, p. 296, 1954.

In work at the Tobacco Institute, Seville, Spain, on the production of mosaic-resistant strains of tobacco [*R.A.M.*, 24, p. 433], segregates No. 60 from resistant Ambalema × Philippine and No. 61 from Ambalema × Kentucky Dark were improved by crossing with more desirable strains, No. 60 being back-crossed to Philippine and other varieties. From the new crossings the desirable selections, Nos. 230-B, 226, 243, and 240, developed very mild symptoms when inoculated with a Spanish strain of tobacco mosaic virus.

Ginoza (W.), Atkinson (D. E.), & Wildman (S. G.). **A differential ability of strains of Tobacco mosaic virus to bind host-cell nucleoprotein.**—*Science*, 119, 3087, pp. 269–271, 2 graphs, 1954.

In studies at the University of California, Los Angeles, it was found possible to group the strains of tobacco mosaic virus under investigation on a basis of biological, physical-chemical, and serological characters. Those in group I, including common tobacco mosaic virus, were all obtained as clear amber pellets on purification by ultra-centrifugation in cacodylate buffer. Those in group II remained colourless after the same treatment. The coloured substance appeared to be somewhat firmly bound to the nucleoprotein of the virus particle. It was, however, possible to dissociate the virus-colour complex by exposure to various di- and polyvalent anions; rate of decolorization depended to a marked extent on temperature. Wide variations in colour resulted from differences in method of preparation, especially in 0·1 *M* phosphate buffer. Decolorization did not measurably alter infectivity or any physical-chemical character used to differentiate groups of strains. No means could be found to dissociate the coloured material from the nucleoprotein. In conclusion, it is suggested that the results obtained may assist workers using various methods of purification to reconcile differences found in the degree of coloration of tobacco mosaic virus preparations.

Alvarez-García (L. A.) & López-Matos (L.). **Results of tests with new fungicides for the control of damping-off of Tobacco in Puerto Rico.**—*J. Agric. Univ. P. R.*, 37, 4, pp. 283–287, 1953. [Spanish summary.]

Experiments to test the efficiency of certain new fungicides in controlling damping-off of tobacco [*R.A.M.*, 33, p. 120], induced by the application of [unspecified] fungal suspensions to the soil, were performed at Aibonito, Caguas, and San Lorenzo, Puerto Rico, in 1950 and 1951. In each locality Bordeaux mixture (4–3–50) and copper A were superior to fermate, dithane Z-78, and parzate (all at 2–100), though each material controlled damping-off. Mortality of 70 to 100 per cent. in the controls was reduced to 2 to 15 per cent. by the copper materials. The use of copper A alternately, every other week, with fermate, which causes marked retardation in growth, would probably offset the tendency to spindled growth during frequent wet periods. The use of dusts in wet weather instead of sprays is also recommended. Copper A, being less soluble and therefore less phytotoxic than Bordeaux, may be applied to seedlings at an early stage.

VALLEAU (W. D.). **Suggestions for more complete control of downy mildew or blue mold of Tobacco.**—*Phytopathology*, 43, 11, pp. 616–618, 1953.

Peronospora tabacina [*R.A.M.*, 33, p. 120] overwinters in two ways in Georgia [32, p. 119], firstly on surviving tobacco plants and secondly by means of oospores in beds used a second year. Elimination of these two modes of overwintering should, therefore, automatically eradicate the fungus from that State. In the Tennessee-Kentucky area, which is out of the direct line of spore movement northwards from Georgia, the pathogen depends almost exclusively on oospores for its survival, and cannot maintain itself year after year without spore showers, particularly if new beds are used. On the other hand, it can do so by these means in the Carolina-Virginia region [14, p. 723]. Presumably, therefore, in the Carolinas the elimination of spore drifts from the south would result in the gradual disappearance of blue mould as in the Tennessee-Kentucky area. The proposal to use new beds and destroy overwintering tobacco plants in the south is quite feasible in view of the efficient organization of the extension services in the States concerned.

BERBEĆ (J.). **Próby zwiększenia odporności Tytoniu (Nicotiana tabacum L.) na choroby drogą krzyżówek w obrębie odmiany.** [Efforts to increase resistance to diseases in Tobacco (*Nicotiana tabacum* L.) by means of crossing within the variety.]—*Acta agrobot.*, 1, pp. 79–82, 1953. [English summary. Received May, 1954.]

During investigations carried out from 1950 to 1952 at Puławy, Poland, F_1, F_2, and F_3 tobacco lines, derived from crosses within Virginia Joyner, were more resistant to black root rot (*Thielaviopsis basicola*) [cf. *R.A.M.*, 33, p. 119] than Virginia Joyner itself. This resistance is attributed to the greater vitality of the hybrid plants.

GÄUMANN (E.), STOLL (C.), & KERN (H.). **Über Vasinfuscarin, ein drittes Welketoxin des Fusarium lycopersici Sacc. Vorläufige Mitteilung.** [On vasinfuscarin, a third wilt toxin of *Fusarium lycopersici* Sacc. Preliminary note.]—*Phytopath. Z.*, 20, 3, pp. 345–347, 1953.

In addition to lycomarasmin and fusarinic acid [*R.A.M.*, 32, p. 700; 33, p. 121], a toxin inducing brown discoloration of tomato stem vessels and leaf veins, herein designated vasinfuscarin, has been isolated at the Federal Technical Institute, Zürich, from culture filtrates of *Fusarium* [*bulbigenum* var.] *lycopersici*. The purified substance is provisionally identified as an enzymatic protein pending further chemical studies. The same or a similar toxin is also produced by cultures of *F. vasinfectum* and *Gibberella fujikuroi*.

GÄUMANN (E.) & NAEF-ROTH (STEPHI). **Über den jahreszeitlichen Gang der Welketoxin-Empfindlichkeit der Tomatenpflanzen.** [On the seasonal course of sensitivity to the wilt toxin in Tomato plants.]—*Phytopath. Z.*, 20, 4, pp. 449–458, 4 graphs, 1953.

This is an expanded account of studies at the Federal Technical Institute, Zürich, Switzerland, on the seasonal changes in the sensitivity of tomato plants to lycomarasmin, a note on which has already appeared from another source [*R.A.M.*, 33, p. 121].

DIMOND (A. E.) & WAGGONER (P. E.). **The water economy of Fusarium wilted Tomato plants.**—*Phytopathology*, 43, 11, pp. 619–623, 1 graph, 1953.

At Connecticut Agricultural Experiment Station the velocity of the transpiration stream in healthy tomato cuttings and in others infected by *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* was measured by means of radiophosphate (P^{32})

movement [*R.A.M.*, 32, p. 517], the rate of which ranged from 0·0091 cm. per second in moderately diseased stems to 0·0045 in severely affected ones, while the figure for healthy stems was 0·25 cm. per second. Thus, the speed of solute movement through infected stems was 2 to 4 per cent. of that in healthy ones. These observations confirm the findings of other workers [33, pp. 56, 122] to the effect that an impediment to water movement is the cause of wilting. Further experiments with turgid leaves on diseased stems and on drought-hardened and succulent healthy leaves supported this hypothesis.

Baumgardt (J. P.). **A study of Fusarium wilt resistance in Tomato plants.**—*Diss. Abstr.*, 13, 6, pp. 962–963, 1953. [Mimeoprinted. Received May, 1954.]

Studies at the University of Missouri demonstrated that xylem gummosis in tomato roots was a typical wound response characteristic of any damaged tomato root and not a resistance reaction to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: see preceding abstracts]. Furthermore, it did not develop until plants exposed to *Fusarium* were already infested. A second vascular plugging, apparently pectic in nature, occurred at the junction of the lateral and primary roots in resistant strains. Microchemical comparisons of resistant and susceptible strains revealed that the former contained a concentration of pentose and pentosan materials, as well as polyphenols [*R.A.M.*, 33, p. 123], in the fundamental parenchyma cells immediately surrounding the xylem that was entirely absent from susceptible strains. The polyphenols were usually present in young tissues, disappearing later, and finally reappearing in the mature tissues. Roots from which a lateral root was excised some distance from the primary axis, the whole being exposed to preparations of the fungus, showed a prompt and definite flush of polyphenol reactivity in the primary xylem elements adjoining the treated lateral root. As hardly any fungal advance occurred in these areas and they were characteristic only of resistant plants, it was tentatively concluded that some *Fusarium*-inhibiting polyphenol may be present, which accounts for the fungistatic nature of the stelar tissues in such plants.

Boyce (J. S.) & Garren (K. H.). **Compatibility types of the Oak wilt fungus in 23 Appalachian trees.**—*Phytopathology*, 43, 11, pp. 644–645, 1 diag., 1953.

Of 727 samples collected in 1952 from 23 oak trees infected by *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, p. 326] in North Carolina and eastern Tennessee, only 253 yielded the fungus. All but one of the trees contained only one compatibility type [loc. cit.]. Only one compatibility type was isolated from a particular group of trees within root-graft distance of one another.

In the single tree containing both compatibility types B was present throughout the stem, while A was isolated alone from a single branch in the upper crown and mixed with B from two branches. This tree was situated 15 and 55 ft., respectively, from two other oaks, both of which harboured type B. All three were within root-graft distance of trees that had probably died in 1951 and may have been responsible for the conveyance of B to the tree containing both compatibility types, while A was very likely introduced into the upper crown through the agency of insects [see next abstract], as suggested by Craighead and Morris (*Penn. For. Wat.*, 4, pp. 126–129, 1952).

Jewell (F. F.). **Viability of the conidia of Endoconidiophora fagacearum Bretz, in the fecal material of certain Nitidulidae.**—*Plant Dis. Reptr*, 38, 1, pp. 53–54, 1954. [Multilithed.]

Experiments at West Virginia Agricultural Experiment Station demonstrated that conidia of the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara*

quercina] may pass through the intestinal tract of nitidulid beetles in a viable condition [cf. *R.A.M.*, 33, p. 188]. Fertile perithecia were produced in culture on the majority of the colonies of type B compatibility spermatized with faeces of *Glischrochilus fasciatus* and *G. sanguinolentus* previously fed on type A. It is suggested that spores surviving in faeces might infect oak trees when deposited on suitable, fresh wounds.

MARCHIONATTO (J. B.). **Desecación de las ramitas del Sauce de Adorno.** [Desiccation of the branches of Goat Willow.]—*Rev. Fac. Agron. B. Aires*, 13, 2, pp. 218–225, 4 figs., 1952. [English summary.]

Goat willow (*Salix caprea*) in the Botanical Garden of the Faculty of Agronomy and Veterinary Science, Buenos Aires, was affected in 1948–9 by desiccation and canker of the branches due to *Botryosphaeria ribis* [*R.A.M.*, 18, p. 486]. Pathogenicity was established in inoculation experiments on one-year-old seedlings which subsequently died.

JAUCH (CLOTILDE). **La 'antracnosis' de los Sauces cultivados en el Delta del Paraná.** [Anthracnose of cultivated Willows in the Paraná Delta.]—*Rev. Fac. Agron. B. Aires*, 13, 2, pp. 285–308, 5 figs., 1952. [English and German summaries.]

Hybrid willows in the Paraná Delta, Argentina, are attacked severely by purple leaf spot (*Marssonina kriegeriana*) [*R.A.M.*, 25, p. 383] and weeping (*Salix babylonica*) and cricket bat willows (*S. alba* var. *caerulea*) by *M. salicicola* [18, p. 154], the latter being newly recorded in Argentina. The three willows comprise the principal timber resources in an area covering roughly 50,000 ha. and containing more than 90,000,000 trees. The foliage of all three bore spots typical of both *M.* spp. but only *S. alba* var. *caerulea* also developed lesions and sometimes true cankers, generally at the point of branch insertion, typical of *M. salicola.*

In culture colonies of *M. salicicola* were mamillate and those of *M. kriegeriana* acicular. Typical spots developed on the leaves of the three willow species in the laboratory and field when inoculated with either spore suspensions or mycelial fragments of the two fungi. In nature positive results on the branches of *S. alba* var. *caerulea* were obtained only with *M. salicicola.*

STEWART (D. M.). **Factors affecting local control of White Pine blister rust.**—*Diss. Abstr.*, 13, 5, pp. 614–615, 1953. [Mimeoprinted. Received April, 1954.]

An extensive study was made at the University of Minnesota of the feasibility of controlling white pine blister rust (*Cronartium ribicola*) [*R.A.M.*, 32, p. 525] by eradicating *Ribes* spp. [32, p. 519] with and without supplementary removal of cankers on eastern white pine (*Pinus strobus*) in the northern part of the State. Rust was controlled effectively by one eradication on one area burned-over 26 years prior to planting with white pine; 12 years after removal of *Ribes* bushes, only 6·4 per cent. of the trees were cankered. However, on a second area burned-over one to two years before planting, control was ineffective either because of the continual regeneration of *Ribes* within five years of the fire, or eradication proved too expensive. Neither the planting of pines nor *Ribes* eradication is advisable on recently burned areas.

Since *Ribes* eradication alone was not sufficient, cankers were eliminated from young planted trees by pruning the branch when the canker was 6 in. from the trunk; where it was nearer the trunk the bark around the stub was excised in addition; where the canker was on an upper main stem the top of the tree was lopped below the canker margin. After three years canker incidence was nil, nil to 31, and 5 per cent., respectively. In sapling-size natural forest trees removal of

all the lower branches and those with cankers on the upper five whorls was more effective after five years than removing the diseased limbs only.

It is concluded that where *Ribes* can be removed effectively and economically supplementary elimination of cankers is justified in young plantings to ensure well-stocked stands, as is pruning in valuable, well-stocked natural stands.

ANDREWS (S. R.). **Western red rot of ponderosa Pine.**—*Diss. Abstr.*, 13, 6, p. 940, 1953. [Mimeoprinted. Received May, 1954.]

Western red rot caused by *Polyporus anceps* is the most important heart rot in living *Pinus ponderosa* [see next abstract; *R.A.M.*, 23, p. 51] in Arizona, New Mexico, and the Black Hills of South Dakota, infecting recently dead branches still covered with bark, invading the wood, and thus penetrating into the trunks. Losses amount to 15 to 20 per cent. in virgin stands and 5 to 10 per cent. in cut-over stands. The decay increases in length by about 1·5 ft. per decade.

The examination of numerous fruit bodies revealed that *P. ellisianus* [loc. cit.; 30, p. 349] is identical with *P. anceps*. A comparison of cultures of 34 isolates of *P. anceps* from different hosts and regions on various media demonstrated the presence of several races or varieties.

ANDREWS (S. R.). **Effect of pruning on western red rot in young ponderosa Pine in the southwest.**—*J. For.*, 52, 1, pp. 33–38, 1954.

Surveys to determine the relationship between pruning and the incidence of diseases in pine (*Pinus ponderosa*) were conducted in 1947 in the Coconino, Kaibab, and Sitgreaves National Forests, Arizona, on trees pruned between 1933 and 1940, and in 1949 in Kaibab and Sitgreaves, and also in the Carson, Cibola, and Sante Fe National Forests of New Mexico, pruned in 1939. They showed that knots exposed by pruning are unimportant as entry points for diseases, and that pruning arrests or results in the death of the red rot fungus *Polyporus anceps* [see preceding abstract; cf. *R.A.M.*, 32, p. 664] in some of the knot infections that had not reached the heartwood. The pruning of stands under 60 years of age, in which infection development is slower than in older trees, is recommended as an effective means of reducing red rot incidence. In 50-year-old trees 19 per cent. of the infections exposed by pruning were active and were already in or likely to grow into the heart wood, in contrast to 73 per cent. in unpruned branches, the corresponding figures for the 60-year class being 54 and 80 per cent.

HUBERT (E. E.). **Studies of Leptographium isolated from Western White Pine.**—*Phytopathology*, 43, 11, pp. 637–641, 2 figs., 1953.

Between 1949 and 1952 the author made a number of isolations of *Leptographium* spp. from western white pine (*Pinus monticola*) both within and outside the present known range of pole blight infection in Idaho [*R.A.M.*, 33, p. 59] and western Montana. Another host of these fungi in the northern Rocky Mountain region is lodgepole pine (*P. contorta* var. *latifolia*). Inoculation experiments indicated that, despite the production of a phytotoxin by the fungus and the ability to infect wounded pine seedlings, *Leptographium* sp. is not a primary cause of the death of trees with pole blight symptoms.

TERRIER (C.). **Note sur Lophodermium macrosporum (Hartig) Rehm.** [Note on *Lophodermium macrosporum* (Hartig) Rehm.]—*Phytopath. Z.*, 20, 4, pp. 397–404, 1953. [German summary.]

In 1942 attention was drawn [*R.A.M.*, 21, p. 472] to the existence on spruce in Switzerland of *Lophodermium filiforme*, described by Darker [12, p. 254] as distinct from *L. macrosporum*. The former species is, however, reduced to synonymy by the

author on the following grounds. The length of 60 μ assigned to the ascospores by Hartig in his original diagnosis of *Hysterium* (*Hypoderma*) *macrosporum* (Wichtige Krankheiten der Waldbäume. J. Springer, Berlin, 1874) does not correspond to the illustrations in the same publication, from which a length of 125 to 177 μ can be calculated. In 1882, moreover, Hartig expressly stated (Lehrbuch der Baumkrankheiten. 1 Aufl. J. Springer, Berlin) that the spores of his fungus were twice as long as those of *Hypoderma nervisequium*. All the measurements given by mycologists for ascospore length in *L. macrosporum* refer to immature and consequently atypical material. In conformity with the measurements obtained from Hartig's illustrations, the length of the Swiss specimens ranged from 90 to 180 (mostly 130 to 145) μ.

It would appear, therefore, that there is only one species of *Lophodermium* with filiform spores on spruce, namely, *L. macrosporum* (syns. *L. filiforme*, *Lophodermellina macrospora*, and *Dermascia filiformis* [*R.A.M.*, 15, p. 54]).

McKay (R.) & Clear (T.). **Association of Rhizina inflata with group dying of Sitka Spruce.**—*Irish For.*, 10, 2, pp. 58–59, 1953.

During a visit to Ireland in 1953 by J. S. Murray of the British Forestry Commission, several Sitka spruce plantations were inspected, where dead and dying groups were stated to be typical of those occurring in Great Britain [*R.A.M.*, 33, p. 190]. In September the authors inspected a patch of Sitka spruce in Glendalough, Co. Wicklow, where, beside a diseased patch thinned out three or four years before, fructifications of *Rhizina undulata* were found at the base of between two and three dozen 30-year-old trees. Resin flow was profuse from affected trees, in some cases up to a height of three or four feet above ground. Although in many cases the entire root system was dead, no rot of any kind was found in the base of the stem of a tree felled as a sample. The fungal fructifications occurred on the soil surface around the base of the stems, often over a dead root. Fungal hyphae were present in the cortical part of brown lesions on the roots.

Mangenot (F.). **Sur quelques Hyphales dématiées lignicoles.** [On some wood-inhabiting dematiaceous Hyphomycetes.]—*Rev. Mycol.*, 18, 2, pp. 133–147, 10 figs., 1953.

Descriptions are given of a number of fungi found on rotting timber in France, with notes on their systematic position [cf. *R.A.M.*, 32, p. 600; 33, p. 395]. *Bisporomyces lignicola* n.sp., found on a fallen beech trunk, is characterized by a thin, hyaline mycelium and dark conidiophores measuring 75 to 115 by 3·5 to 4 μ and terminating in a cylindrical phialide producing pseudo-endogenous conidia measuring 3·5 to 8 by 1·5 to 2·7 (5·9 by 2·4) μ. *Chloridium minus* was also present on the same trunk; the conidia measured 1·3 to 3·5 by 1·3 to 2·9 μ. Other fungi found were *Cordana pauciseptata* on decaying birch, ash, and beech, *Acrothecium* sp. on beech, and *Cacumisporium tenebrosum*, often associated with *B. lignicola*.

Wise (L. E.) & Jahn (E. C.). **Wood Chemistry. Volume 2, 2nd Edition.**—ix+pp. 691–1343, 32 figs., New York, Reinhold Publishing Corporation, 1953. $15.00.

Volume two of this work, the first volume of which was concerned with the structure and physical and chemical properties of wood, deals with the surface properties, chemical utilization, biological decomposition, and chemical analysis. The chapter (27) on the decomposition of wood by micro-organisms and insects is contributed posthumously by W. G. Campbell (pp. 1061–1118). After a preliminary review of the natural decay of wood and the factors affecting its susceptibility to attack by parasites and saprophytes, the chemistry of fungal decay processes is described. A table is given of 18 wood-destroying basidiomycetes and the enzymes they are known to produce. The chemical differences between brown and white

rots are discussed, and the effects of fungal decay on the properties of timber, on pulpwood, and on timber in water. Moulds and sap strains and some metabolic products of wood destroying fungi are reviewed. An exhaustive bibliography of 195 titles is included in this chapter.

Da Costa (E. W. B.). **The use of chemicals in the control of blue stain in Pinus radiata.**—*For. Prod. News Lett., Melb.*, 194, pp. 3–4, 7, 1953. [Abs. in *For. Abstr.*, 15, 2, p. 242, 1954.]

The author describes simple equipment for the hand- or mechanical dipping or spraying of *Pinus radiata* boards immediately after sawing for the prevention of blue stain [*R.A.M.*, 33, pp. 329, 393], giving suitable formulae for preservatives containing sodium pentachlorophenate, borax, and water with or without the inclusion of an organic mercury compound. He also discusses precautions to be taken in using these materials and the means of protecting logs with pentachlorophenol when there is a time lapse between felling and sawing.

Narayanamurti (D.), George (J.), & Verma (G. M.). **Studien zur Biochemie holzzerstörender Pilze — Zweite Mitteilung : Pilzamylase.** [Studies on the biochemistry of wood-destroying fungi—second note: fungal amylases.] — *Holz a. Roh- u. Werkst.*, 10, 11, pp. 428–432, 13 figs., 1952.

At the Forest Research Institute, Dehra Dun, India, the amylases of *Polystictus sanguineus* and *Fomes lamaensis* were investigated [cf. *R.A.M.*, 33, p. 192]. Dialysis enhanced enzymatic activity, the optimum pH for which with both fungi was about 5. The optimum activity of the enzymes of *P. sanguineus* was at about 35° C. in malt cultures; for *F. lamaensis* it was 50° in a peptone and 45° to 50° in a malt solution, the extracellular enzyme being more active than the intracellular. The amylase of *P. sanguineus* remained stable for a week in aqueous solution at room temperature and then its activity gradually declined; that of *F. lamaensis* was more stable. Ascu [loc. cit.; 33, p. 127] and copper sulphate depressed enzymatic activity and so did arsenic pentoxide, except in minimal concentrations, which were stimulatory.

Lohwag (K.). **Prüfmethoden von Holzschutzmitteln gegen den Angriff holzzerstörender Pilze.** [Methods of testing timber preservatives against the attack of wood-destroying fungi.]—*Allg. Forstztg* (formerly *Allg. Forst- u. Holzw. Ztg*), N.F., 64, 21–22, pp. 270–272, 1953.

Laboratory methods recommended for the assay of timber preservatives against fungal decay in Austria comprise the German standard process known as DIN–DVM 2176 [*R.A.M.*, 21, p. 277], test tube culture, e.g., on malt agar, Trendelenburg's impact bending technique [22, p. 46], the use of sticks as prescribed by Theden [32, p. 655], and Leutritz's soil-contact procedure [33, p. 392]. The Swedish method of soil inoculation in accelerated test plots [32, p. 1] is advocated for field experiments.

Koljo (B.). **Die Abhängigkeit der Tränkmittelaufnahme des Holzes von verschiedenen Faktoren unter besonderer Berücksichtigung von Kiefer und Fichte.** [The dependence of wood impregnation on various factors with special reference to Pine and Spruce.]—*Holz a. Roh- u. Werkst.*, 11, 8, pp. 303–311, 3 figs., 8 graphs, 1953.

A fully detailed, tabulated account is given of studies at the Swedish Timber Research Institute, Stockholm, to elucidate the factors concerned in the differential uptake of water-soluble and oily preservatives (the former group represented by 1 per cent. copper sulphate and the latter by coal tar oil) by pine, spruce, oak, and birch wood.

On the basis of their anatomical structure [*R.A.M.*, 32, p. 654], birch and pine sapwood are readily saturable, while pine and oak heartwood and spruce can be impregnated only with difficulty. In all the woods except birch the minimum adsorption was in the tangential direction of the fibres and the maximum in the axial, with the radial intermediate. In birch the minimum was in the radial direction. The adverse effect on adsorption exerted by the presence of air in the wood may be counteracted to some extent by raising the impregnation pressure from 1 to 10 kg. per sq. cm. and the temperature from 20° to 90° C., as well as by extending the duration of treatment from 10 to 90 minutes. At low pressures and with brief periods of immersion there was a greater uptake of copper sulphate than of tar oil, but the differences between the two preservatives were negligible when the pressure was raised and the treatment prolonged. For spruce the mean adsorption ratios were 1:3·6 in favour of copper sulphate. At low pressures and with short treatments the spruce samples took up less copper sulphate than those of pine, but the position was reversed with a rise in temperature and an extension of the soaking period. With tar oil the adsorption ratio of spruce to pine was 1:2·6.

Fisher (Eileen E.). **A root gall on Radish caused by Albugo candida (Pers.) Kuntze.**—*Proc. roy. Soc. Vict.*, 65, 2, pp. 61–62, 1 pl., 1954.

Root galls on Long Scarlet radishes from South Warrandyte, Victoria, Australia, examined at the Plant Research Laboratory, Burnley, Victoria, in 1952 were found to contain oospores of *Cystopus candidus* [cf. *R.A.M.*, 30, p. 194; 32, p. 81] and abundant small, globular haustoria. Leaf pustules were not present on these specimens [cf. 32, p. 192], most of the plants being practically defoliated as the result of severe attacks by the cabbage butterfly, *Pieris rapae*.

Walker (J. C.), Larson (R. H.), & Pound (G. S.). **Badger Market, a new disease resistant Cabbage.**—*Phytopathology*, 43, 12, pp. 649–650, 1 fig., 1953.

A description is given of Badger Market, a new round-head, second-early cabbage variety developed jointly by the Bureau of Plant Industry and the Wisconsin Agricultural Experiment Station, which is highly resistant to yellows (*Fusarium oxysporum* f. *conglutinans*) [*F. conglutinans*: *R.A.M.*, 31, p. 312; 33, p. 71] and moderately so to cabbage mosaic virus (turnip virus 1 [mosaic virus] plus cauliflower virus 1 [mosaic virus: 33, p. 271]).

Stout (G. L.), Altstatt (G. E.), & Nakayama (R. M.). **Club root of crucifers.**—*Bull. Dep. Agric. Calif.*, 42, 3, pp. 113–118, 1 col. pl., 3 figs., 1953.

The known occurrence of club root disease of crucifers (*Plasmodiophora brassicae*) [*R.A.M.*, 33, p. 192] in California is limited to parts of the peninsular area of San Francisco and to San Mateo county, where it is a limiting factor in the production of Brussels sprouts. It has been found there on many crucifers, including braschetti (*Brassica* sp.), curly mustard (*B. juncea* var. *crispifolia*), and wild mustard. Young plants for transplanting should be grown only in soil which does not contain the fungus, and transferred to fields where the disease is not present. If healthy plants must be grown in infested soil, mercuric chloride should be used in the transplant water to protect the young tap-root from infection. This is useful only in minimizing the effects of the disease and is no substitute for seed-bed sanitation or for planting in disease-free soil.

Sill (W. H.) & Pady (S. M.). **1953 epiphytotic of curly top of Sugar Beets in Kansas.**—*Plant Dis. Reptr*, 38, 1, p. 57, 1954. [Multilithed.]

A severe epiphytotic of sugar beet curly top virus [*R.A.M.*, 33, p. 400] in the irrigated growing areas in the neighbourhood of Garden City and Scott City, Kansas, in 1953 reduced the tonnage per acre by about 50 per cent., 75 per cent.

or more of the plants being infected. *Eutettix tenella* was found in abundance in the area.

WATSON (M[ARION] A.). **Beet yellows virus and other yellowing virus diseases of Sugar Beet.**—*Rep. Rothamst. exp. Sta., 1951*, pp. 157–167, 1952.

Yellowing diseases of sugar beet have recently been reported from Australia by L. Stubbs (Plant Diseases Conference (Duplicated Report) Australian Agricultural Council, Melbourne, 1949) and from the United States [see above, p. 400], but whether they are identical with beet yellows virus disease in Europe [C.M.I. map No. 261; *R.A.M.*, 33, p. 331; next abstract and above, p. 407] is as yet undetermined. The author adduces evidence which suggests that there is a range of viruses, not all closely related, which cause yellowing in sugar beet.

Work at Rothamsted has indicated that it is unlikely that '41' yellows [loc. cit.], Irish mild yellows [loc. cit.], and sugar beet yellows are the same virus or even very closely related strains. The Australian disease resembles beet yellows in the field and is transmissible by aphids to spinach, but apparently it could not be re-introduced into sugar beet in greenhouse experiments. It also failed to precipitate specifically with beet yellows antiserum.

In a study of the etch symptoms in plants infected with beet yellows virus [cf. 33, p. 130] isolates from old, field-grown plants, in which etch symptoms had persisted, gave rise to infected plants in which the etch symptom remained throughout life, even when yellowing had disappeared. Sap from these plants precipitated with antisera made against yellows sap and gave higher titres. When yellows plants were inoculated with the necrotic (N) etch isolate when the etch symptoms had almost disappeared no further etch developed, but healthy plants inoculated with N developed persistent etch. On the basis of cross protection mild yellows is more distantly related to yellows than is the N strain. The latter proved stable and is useful for experiments, as it causes easily recognizable symptoms in the glasshouse in winter.

In transmission tests with the virus resembling yellow net (yellow net mild strain) [see above, p. 407], isolated in Lincolnshire, some plants produced symptoms indistinguishable from those of mild yellows. Mild yellow net is easily isolated from the yellow net complex and appears to be uniform and stable, but yellow net virus has not yet been isolated free from the mild strain. The properties of the two viruses appear to be sufficiently like those of yellows for them to be included in the same group. There are some points of resemblance between the yellow net virus and the etch component of yellows: both affect the tissues over the veins and cause chlorosis, neither is much affected by glasshouse as compared with outdoor conditions, they persist through the winter, and both are associated with mild yellowing viruses which can exist independently. Neither the yellow net complex nor the mild component has given positive precipitin tests with beet yellows antiserum.

Other experimental results indicated that though beet yellows virus is the cause of the yellowing symptom, it cannot produce that symptom when the carbohydrate content of the leaves is low [cf. 31, p. 217; 33, p. 130], but where this is greatly in excess yellowing is severe. The reason why yellowing does not occur in young infected leaves is that the carbohydrate content is not in excess of the normal. In shade symptoms are slight or absent.

WENZL (H.). **Neue Erfahrungen über die Vergilbungskrankheit der Rübe.** [New experiences concerning the Beet yellows disease.]—*Pflanzenarzt*, 6, 3, pp. 3–4, 1953.

Winter spinach [beet] is probably of some local importance in the spread of beet yellows virus in Austria [see above, p. 399], but infection is mainly perpetuated by seed crops, and to some extent by fodder beets stored in cellars or clamps [cf.

R.A.M., 32, p. 295; 33, p. 194], and by the overwintering black beet aphid [*Aphis fabae*]. Fairly severe infection was observed at distances of 15 km. and upwards from the nearest seed-bearers [cf. above, p. 399].

Bazzigher (G.). **Über mutmasslich induzierte Abwehrreaktionen bei Phaseolus vulgaris L.** [On supposedly acquired defence reactions in *Phaseolus vulgaris* L.]—*Phytopath. Z.*, 20, 4, pp. 383–396, 2 figs., 1 diag., 11 graphs, 1953.

Experiments were carried out at the Federal Technical Institute, Zürich, to investigate the inducement of defence reactions [*R.A.M.*, 32, p. 269] in bean (*Phaseolus vulgaris* var. Wädenswil) to infection with *Botrytis cinerea* [13, p. 795; 14, p. 712]. When the seeds were soaked in 8- to 14-day-old culture filtrates of the pathogen for 18 hours a 25 per cent. reduction in susceptibility of 10-day-old plants to inoculation resulted. Bean plants were found to contain a pre-formed fungistatic and bacteriostatic substance, the *in vitro* activity of which increased progressively with lengthening exposure to light (up to four hours) and declined in darkness. Methods are described for the extraction of this substance and for that of the toxin in culture filtrates of *B. cinerea*, which were assayed for toxicity by Kobel's *Ustilago zeae* [*U. maydis*] spore germination test [32, p. 32].

Klinkowski (M.) & Behr (L.). **Die 'Schwarzbeinigkeit' der Phaseolus-Arten.** [The 'black legginess' of *Phaseolus* species.]—*Phytopath. Z.*, 20, 4, pp. 405–420, 10 figs., 3 diags., 1952.

From the Phytopathological Institute of the Martin Luther University, Halle-Wittenberg, the authors describe 'black legginess' or wilt disease of beans [bean mosaic virus: *R.A.M.*, 31, p. 163; 33, p. 12], which has been prevalent since 1948 in central Germany on runner (*Phaseolus* [*multiflorus*]) and occasionally on dwarf beans (*P. vulgaris*). The most prominent symptom at the 'green-ripe' stage is the sudden onset of an often complete wilt. The roots and the base of the hypocotyl turn black and typical necrosis develops in the interior of the roots, the leading and side shoots, the pods, and eventually also in the petioles. The disease is restricted to certain varieties, e.g., Mombacher and Juli among the runners and the dwarf Bernburger Schwarze. The results of microchemical analyses of the pods of diseased plants indicate that the products of necrosis represent substitution or oxidation products of tannins. The disease is transmissible in high percentages through the seed.

Evidence of virus agency in the etiology of the wilt was afforded by needle puncture inoculation and contact grafting experiments.

Quantz (L.). **Untersuchungen über ein samenübertragbares Mosaikvirus der Ackerbohne (Vicia faba).** [Studies on a seed-transmissible mosaic virus of the Broad Bean (*Vicia faba*).]—*Phytopath. Z.*, 20, 4, pp. 421–448, 16 figs., 1953.

Some of the information in this amplified account of studies at the Virus Research Institute, Celle, on a prevalent mosaic of broad bean (*Vicia faba* var. *minor*) in Germany [*R.A.M.*, 32, p. 613] has already been presented from another source [30, p. 300, where the disease was attributed in error to pea mosaic virus]. The virus is described as new, and given the name *Viciavirus varians*, with the common name of 'Echte Ackerbohnemosaic' [true broad bean mosaic]. Natural infection has also been observed on *Vicia sativa*, field and garden peas, *Lathyrus tingitanus*, and *V. narbonensis*. The host range of the virus was extended by sap inoculation experiments to include the foregoing species and *Cicer arietinum*, sweet pea, *L. sativus*, *Melilotus alba*, *M. officinalis*, *Pisum melanocarpum*, *Trigonella coerulea*, *V. hirsuta*, *V. pannonica*, and *V. villosa* with its var. *glabrescens*. Peas reacted to infection by drastic reduction in leaf size, variable mosaic patterns, crinkling, the

formation of colourless, transparent leaf spots, compression of the stems, and to a varying extent by wilting and generalized necrosis. On broad beans, peas, and other hosts the symptom picture was subject to seasonal modifications, wilting of the leaves and shoot tip and in some cases generalized necrosis being predominant during the winter months. No definite indication of resistance to the new virus was found in a test assortment of 23 broad bean and 69 pea varieties, the latter including the normally virus-resistant Perfection and Surprise.

The thermal death point of the virus (normal strain) [loc. cit.] was usually under 70° but occasionally up to 75° C.; it withstood dilution up to 1 in 1,000 but not 1 in 10,000 and ageing *in vitro* for less than seven days, and retained its infectivity in desiccated plant material for over 15 but under 20 days. Most of the isolates conformed to the strong normal strain. There were a few weak mutants which in premunity tests conferred protection on peas against subsequent infection with the normal strain but not against bean yellow mosaic and pea mosaic viruses, which are therefore considered to be unrelated to the virus under observation.

Seed transmission of broad bean mosaic virus in broad and horse beans produced up to 1 and 2·8 per cent. infected progeny, respectively.

Deutschmann (F.). **Über die 'purple stain'-Krankheit der Sojabohne und die Farbstoffbildung ihres Erregers Cercosporina kikuchii Mats. et Tom.** [On the 'purple stain' disease of the Soy-Bean and the pigment formation by its agent, *Cercosporina kikuchii* Mats. & Tom.]—*Phytopath. Z.*, 20, 3, pp. 297–310, 13 figs., 1 graph, 1953.

Samples of imported American soy-beans examined at the Institute for Applied Botany, University of Hamburg, showed a purplish discoloration of the testa due to *Cercosporina* [*Cercospora*] *kikuchii*, hitherto recorded only in Korea (*Chosen Nakaiho*, 16, pp. 24–28, 1921), Japan [*R.A.M.*, 4, p. 714], and the United States [30, p. 503; 32, p. 532]. The fungus remains localized in the testa until the seed germinates, when it invades the seedling tissue. The morphological and physiological development of *C. kikuchii* in pure culture was typical of *Cercospora* spp. On nutrient media, e.g., cherry, oatmeal, and glucose agars, the fungus produced the same purplish tinge as on the seeds. Light, oxygen, and a moderately acid reaction of the substratum (pH 4 to 6) are indispensable factors in pigmentation. In young cultures the pigment was deposited on the hyphae in various forms, among which a crystalline structure was particularly well defined.

Frandsen (N. O.). **Ascochyta sojaecola auf Sojabohne in Deutschland.** [*Ascochyta sojaecola* on Soy-Bean in Germany.]—*Phytopath. Z.*, 20, 4, pp. 375–382, 8 figs., 1953. [English summary.]

Information is presented on the geographical distribution, symptomatology, morphology, pathogenicity, and significance of *Ascochyta sojaecola*, which was found attacking soy-beans in Lower Saxony and Baden in 1951 and 1952. This appears to be the first record of the fungus in a European country, though it has been reported from the Asiatic U.S.S.R. [*R.A.M.*, 20, p. 233]. Inoculation experiments with monospore isolates gave positive results on soy-bean, *Glycine ussuriensis*, and bean (*Phaseolus vulgaris*), with recovery of the pathogen from the leaf spots.

Larson (R. H.) & Walker (J. C.). **Thiram for smut control in Onion set plantings.** —*Phytopathology*, 43, 11, pp. 596–597, 1953.

Most of the information in this amplified survey of the results of six years' experiments in Wisconsin on onion smut (*Urocystis cepulae*) control by dusting the

seed with arasan (containing thiram) has already been presented [*R.A.M.*, 32, p. 417]. During the course of the trials applications containing $\frac{1}{10}$ lb. thiram per lb. of seed came into general use in the Racine-Kenosha area. In 1952 an inspection of four heavily infested commercial fields sown with thiram-treated seed revealed a maximum smut incidence of 3·6 per cent. [cf. 33, p. 135].

Buchwald (N. F.). **Botryotinia (Sclerotinia) globosa sp.n. on Allium ursinum, the perfect stage of Botrytis globosa Raabe.**—*Phytopath. Z.*, 20, 3, pp. 241–254, 11 figs., 1953. [German summary.]

Sclerotia of *Botrytis globosa* collected on leaves of *Allium ursinum* in Jutland, Denmark [*R.A.M.*, 25, p. 91], in March, 1943 and 1948, germinated in March of the following years by means of apothecia, which matured in April and discharged ascospores. The resting period was spent on moist sand in glass dishes, either in the garden of the Agricultural College, Copenhagen, (1943–4) or at 3° C. in a refrigerator (1948–9). Sclerotia developing in November in pure culture on potato dextrose agar also germinated in the same way after 11 months at 3°. Isolates arising both from ascospores and conidia attacked the leaves and peduncles of the host, the incubation and fructification periods being two to three and three to four days, respectively.

A genetic connexion has thus been demonstrated between *B. globosa* and a perfect state which must be referred to *Sclerotinia sensu lato* and more precisely to *Botryotinia* [32, p. 416]. The fungus is therefore named *Botryotinia* (*Sclerotinia*) *globosa* n.sp. The light brown apothecia, emerging singly or in pairs from the sclerotia, are 1 to 2 mm. in diameter, with concolorous, smooth stipes, turning black at the base, and 1 to 5 mm. in height. The asci measure 225 by 12 μ and the ascospores 16·5 (occasionally 13) to 24 by 6 to 9 or up to 12 μ.

Green (D. E.) & Hewlett (M. Ann). **Parsnip canker : selection of resistant stocks of Parsnip.**—*Nature, Lond.*, 173, 4408, pp. 779–780, 1954.

As a continuation of previous studies on parsnip canker (? caused by *Streptomyces* [*Actinomyces*] *scabies*) [*R.A.M.*, 30, p. 94; 32, p. 358] at Wisley, Surrey, a watch was kept for roots remaining clean in areas where canker was abundant, so that they might form a basis for the selection and breeding of resistant stocks. The first ten roots were selected at the end of 1948, a very bad canker year; seven of these survived and their seed was sown in 1950 in heavy land usually subject to canker. None was severely diseased and stocks Nos. 4 and 5 were quite clean. Seed from seven roots of these stocks was sown on the same land in 1952. Infection in six stocks in March, 1953, varied from 0 to 11 per cent. The seventh stock, the seed of which had been badly discoloured, yielded 34 per cent. cankered roots, but they were very large and weighed, on an average, 50 per cent. more than the roots in the next heaviest stock. This feature may have some connexion with susceptibility to canker. The stocks have now been passed on to the Vegetable Research Station, Wellesbourne.

Miller (L. I.). **Studies of the parasitism of Cercospora arachidicola Hori and Cercospora personata (B. & C.) Ell. & Ev.**—*Diss. Abstr.*, 13, 5, pp. 644–645, 1953. [Mimeoprinted. Received April, 1954.]

Of 697 *Cercospora* isolates obtained during a survey [of groundnuts] in ten southern States during 1947, five that were culturally distinct and of the conidial type belonged to *C. personata* and the rest, of which 122 were culturally different, to *C. arachidicola* [*R.A.M.*, 28, p. 374]. The conidial types of the latter species were the most pathogenic. Races of both fungi may be present on the same lesions and different races may infect the same plant, leaflet, or lesion. Ascospores were produced in one pure culture of *C. arachidicola*. The temperature range for the growth

of three races of this species was 2° to 35° C. (optimum 25° to 32°) and for three races of *C. personata* 4° to 34° (25° to 30°). Those of *C. arachidicola* grew more rapidly than *C. personata*. Spore formation and germination occurs only in humid conditions.

The variety Spanish 146 [loc. cit.] is a good differential variety for testing the pathogenicity of biotypes. There appears to be a relation between the type of lesion on this variety and the pathogenicity of the biotype when temperatures favour the shedding of infected leaves, the larger the infected area the sooner shedding will follow. Resistant varieties have a longer growth period than susceptible ones. Of 113 erect varieties tested for reaction to *C. arachidicola*, P.I.153342 was the most resistant and P.I.161316 the most susceptible. Of 49 prostrate varieties, P.I.149637 was the most resistant and Va. RJS the most susceptible. Resistance appeared to be correlated with a high riboflavin content of the seed.

Sauger (L.). & Catherinet (M.). **La rosette chlorotique de l'Arachide et les lignées sélectionnées.** [Chlorotic rosette of Groundnut and selected progeny.]—*Agron. trop. Nogent*, 9, 1, pp. 28–36, 5 figs., 2 graphs, 1954.

In 1952 the groundnut lines 48–7, 48–14, 48–15A, 48–21, 48–34, 48–35, 48–36, 48–37, 48–44, 48–45, and 48–70A (progeny of mother-plants grown at Ferkéssédougou Station, Ivory Coast), growing on three different sites at the Centre for Agricultural Research, Bambey, Senegal, remained completely unaffected by rosette virus [*R.A.M.*, 30, p. 56; 33, p. 16], though the season was favourable for its development and all 396 other lines grown were completely affected. In transmission experiments with the lines 48–37 and 48–70A infected by means of insect vectors [? *Aphis craccivora*] and with 48–34 and 48–35 grafted by two different methods no symptoms developed. Further work is in progress.

Stoner (W. N.). **Leafhopper transmission of a degeneration of Grape in Florida and its relation to Pierce's disease.**—*Phytopathology*, 43, 11, pp. 611–615, 2 figs., 1953.

This is a full account of investigations on the transmission of Pierce's disease (alfalfa [lucerne] dwarf virus) to vine and lucerne in Florida, an abstract of which has already been noticed [*R.A.M.*, 33, p. 137].

Stellwaag (F.). **Stand der Kenntnisse über die Reisigkrankheit der Rebe.** [The status of information on the court-noué disease of the Vine.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 7, pp. 101–106, 5 figs., 1953.

Certain aspects of court-noué disease of the vine are discussed in the light of recent information. At the moment its occurrence in Germany is restricted to a few localities, but with the increasing use of grafting in viticulture an extension of its range is feared. Asymmetry of the internodes [*R.A.M.*, 18, pp. 371, 810, 33, p. 207], especially in conjunction with other symptoms, may be indicative of court-noué but is not a dependable criterion of the degree of infection, certainly not in the early stages.

The presence of intracellular cordons is undoubtedly another sign of degeneration, but the absolute parallelism with the severity of the disease which has been attributed to it [16, p. 622] could not be confirmed. The reason for the occasional presence of cordons in well-grown and productive vines is also obscure.

There is no scientific evidence that transmission of court-noué from the affected to the healthy partner in a graft combination [15, p. 629; 32, p. 170] leads to progressive enfeeblement, nor has the spread of the disease through the soil [13, p. 214; 32, p. 302] been conclusively demonstrated.

The author does not accept the virus nature of court-noué [28, p. 207] and has explained (*Weinbau*, 2, *Wiss. Beih.*, p. 115, 1948) that the problem is one of ecology rather than parasitism. This standpoint is also supported by Schneiders (*Weinbau*, 2, 1947), who maintains that vines affected by court-noué may be reasonably productive for as long as 60 years, and that in practice there is no question of an infectious disease. Only in the worst types of soil, where malnutrition prevails, does the virus associated with the disease assume a virulent form.

Stalder (L.). **Das Problem der Botrytisbekämpfung im Weinbau.** [The problem of *Botrytis* control in viticulture.]—*Schweiz. Z. Obst- u. Weinb.*, 62, 6, pp. 105–107; 7, pp. 128–132, 1 diag., 1953.

Further experiments having confirmed Blumer's conclusions as to the impracticability of direct control of *Botrytis cinerea* on vine in Switzerland [*R.A.M.*, 31, p. 316 and next abstract], the author discusses the reasons for the failure of fungicidal sprays [cf. 33, p. 203], however toxic to the fungus. On the one hand, they are partially or totally inactivated by environmental factors facilitating the extension of infection, e.g., when the grapes are torn from the pedicels and burst under heavy rains; on the other, the chemicals, applied as they are shortly before ripening, must be non-poisonous and must neither smear nor impart any objectionable flavour to the fruit or wine, and these exacting requirements are difficult to fulfil. Moreover, in thick-skinned varieties such as Gamay précoce, the fungus penetrates so deeply into the inner tissues of the externally symptomless grapes as to be inaccessible to sprays.

By means of a special apparatus [which is described] it was shown that grapes of the very susceptible Riesling × Sylvaner adhere only about half as firmly to the pedicel as those of the resistant Gutedel, Blue Burgundy being intermediate in this respect.

Stalder (L.). **Untersuchungen über die Graufäule (Botrytis cinerea Pers.) an Trauben. 1. Mitteilung.** [Studies on grey mould (*Botrytis cinerea* Pers.) of Grapes. Note 1.]—*Phytopath. Z.*, 20, 3, pp. 315-344, 1 fig., 3 diags., 7 graphs, 1953.

In addition to information on the problem of grey mould (*Botrytis cinerea*) control in Swiss vineyards already presented from another source [see preceding abstract], this amplified account contains a description of an apparatus for the measurement of the resistance of the grape skin to perforation. No direct correlation could be established, however, between frequency of skin infection and resistance to perforation. The relatively low incidence of grey mould on the Gutedel variety [loc. cit.] is attributed in part to resistance to the spread of the pathogen within the berry, which appears to be connected with the chemical composition of the cell sap, though no correlation could be demonstrated between its sugar and acid contents and pH and the rate of fungal growth.

Syamal (N. B.) & Patel (G. I.). **A wild species of Grape in India.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 228–230, 1953. [Received May, 1954.]

A previously undescribed species of *Vitis* with a high resistance to [unspecified] diseases in its natural habitat has been found in the Colegaon Forest, India. The chromosome number is 2n = 40 but the species resembles *V. latifolia* in some morphological aspects. It is hoped that the new species will provide material for resistance in the breeding of resistant grape varieties.

Luttrell (E. S.) & Murphy (M. M.). **Effect of spraying on incidence of diseases and yields of Muscadine Grapes.**—*Phytopathology*, 43, 11, pp. 629–633, 1953.

The most important diseases of muscadine grapes in Georgia are berry rots,

especially bitter rot (*Melanconium fuligineum*) [*R.A.M.*, 28, p. 381], which in 1946, 1950, and 1951 was responsible for 20 to 31 per cent. shelling of berries (which are reduced to dry, hollow shells) on unsprayed Hunt vines and for losses ranging from 13 to 26 per cent., as compared with a maximum of 3 per cent. for all other rots combined, including those due to *Botryosphaeria ribis* [27, p. 409] and *Glomerella cingulata*. In experiments from 1946 to 1950, inclusive, the application of pre-blossom sprays (8–8–100 Bordeaux mixture) to the Hunt variety generally failed to increase yields, and in some years actually reduced them. The most effective schedule consisted of three treatments at fortnightly intervals beginning soon after fruit set, which halved the incidence of berry shelling and bitter rot and produced an average annual increase in yield over the five-year period of 20 per cent. However, the differences between sprayed and untreated vines are not considered sufficient to warrant a recommendation for this form of disease control.

Thirty-second and thirty-third Reports of the Quebec Society for the Protection of Plants 1950 & 1951.—232 pp., 18 pl., 13 figs., 10 graphs, 3 maps, [? 1952. Received 1953.]

The information in an address on the soil application of chemicals (arasan, thiram, and borax) for the control of sugar beet and vegetable seedling diseases by A. A. Hildebrand (pp. 10–17) has already been noticed [*R.A.M.*, 32, pp. 355, 414]. The use of arasan at 3·1 lb. per cu. ft. soil for the control of damping-off of vegetable seedlings [33, p. 380], such as chilli, eggplant, cabbage, cauliflower, spinach, and tomato, but not lettuce or celery, is recommended.

In studies on the influence of sieving on the cleanliness of seeds D. Leblond reports (in French, pp. 29–31) that of the seven samples of [? cereal] seed tested, five had considerably fewer *Ustilago* spores after sieving than before. The marked increase in smut spores on the remaining two samples may possibly have been due to the use of a general sieve which had previously contained seeds with greater smut content and had not been cleaned after use. This was confirmed by a further test.

During inspections of seed potatoes and mature tubers in eastern Ontario and western Quebec in 1950, O. W. Lachaine and E. H. Peters (pp. 198–201) noted that bacterial ring rot [*Corynebacterium sepedonicum*: 33, p. 316] was the chief reason for rejection due to disease. This was followed in numerical order by mosaic viruses [31, p. 509], black leg [*Erwinia carotovora*: 16, p. 487], leaf roll virus [31, p. 509], and *Fusarium* wilt [*F. solani* var. *eumartii*: cf. 32, p. 628]. Two plants infected by yellow dwarf mosaic virus [cf. 27, p. 86] were noted in western Quebec.

C. Perrault reports (in French, pp. 32–34) the results of investigations over ten years on the variation of external symptoms of potato viruses (mild mosaic, severe mosaic, and rugose mosaic [potato viruses X+Y: 31, p. 509]). The symptoms differ in intensity on haulms coming from a single tuber. This variation depends on climatic factors and is more frequent and pronounced in the lower Saint Laurent area than in western Quebec. Tuber-index tests showed that where two or three viruses are present in one tuber their distribution is not uniform owing to their independent progress and dissimilar rates of spread when the shoots begin to grow. The frequency of variation depends on the degree of tuber infection, being smaller in seed pieces of superior grade. In the case of leaf roll virus, however, all the tubers from one hill and all the 'eyes' in one tuber appear to be equally infected, all producing leaf roll symptoms. In the lower Saint Laurent the disease can be eliminated in one crop by using the isolated tuber method of planting and by early harvesting. Tuber-indexing, though not completely eliminating all traces of virus, may be used as a supplement to the former method to improve seed pieces grown in less favourable regions.

In further studies at Macdonald College on the interaction effects between the apple scab fungus (*Venturia inaequalis*) and various saprophytes on overwintered apple leaves (*Rep. Quebec Soc. Prot. Plants, 1949*) J. G. Coulson and L. Cinq-Mars (pp. 35–38) found that the culture extracts of seven fungi of the 58 tested caused complete inhibition of *V. inaequalis*: they were *Oospora lactis*, *Penicillium* spp. Nos. 7 and 9, *Trichoderma lignorum* [*T. viride*], *Rhizopus nigricans* [*R. stolonifer*], *Aspergillus niger*, and *A. fumigatus*. The inhibitory effect of the last four was due to the acid conditions they induced in the culture.

In cultural work on the apple leaf saprophytes the same authors (pp. 209–214) investigated the capacity of these fungi to produce cellulase and pectinase. Out of 69 species investigated, the only ones sufficiently common in orchards to effect the rapid decomposition of dead leaves in the spring by their cellulase or pectinase activity were three species of *Penicillium*, *T. viride*, *Alternaria tenuis*, *Pullularia pullulans* [*R.A.M.*, 32, p. 442], and three undetermined fungi.

Commenting on the 1949 fungicide trials against apple scab [32, p. 173; cf. 33, p. 302] at Rougemont, L. Cinq-Mars states (in French, pp. 43–47) that the temperature conditions were unfavourable for disease development and incidence in trial plots was slight. Phygon XL (1 lb. for the first three sprays, ¾ lb. for the next three, and magnetic 70 for the last two, 8 lb. per 100 gals.), ferbam (eight applications at 2 lb.), and magnetic 70 (seven at 8 lb. and one at 6 lb.) all gave less than 1 per cent. leaf and fruit scab. Up to 3·64 per cent. of the fruit showed russeting, but only the damage caused by phygon XL caused some concern.

Studies by L. Cinq-Mars and J. P. Perron (in French, pp. 48–49) of the meteorological conditions during the 1949–50 winter showed that the alternating high and low temperatures with rain (frequent) and snow, particularly in December and January, greatly contributed to the rapid development of apple scab which was the earliest on record. Ascospores were nearly mature on 20th January. L. Cinq-Mars states (in French, pp. 218–221) that in tests of protective fungicides against apple scab at Rougement in 1950, the period of rain most responsible for infection was that at the end of May. Frequent falls in June and July necessitated many cover sprays. Crag 341 C (1 pint in 100 gals.) was the only fungicide which gave practically complete protection (0·33 per cent. leaf scab in June) against primary attack, the figures for magnetic 70 (8 lb.), ferbam (2 lb.), and mulsoid sulphur (8 lb.) being 5·03, 8·93, and 13·56, respectively; in August after three cover sprays with crag and six with the other fungicides the corresponding figures were 0·31, 16·55, 12·28, and 23·04 per cent. foliage scab and 5·2, 20, 8·7, and 25·4 per cent. fruit scab, respectively. Fungicides containing mercury may eradicate visible scab if applied before the calyx stage. Tag 331 was promising in this respect, particularly in eliminating foliage infection, but repeated applications were necessary.

J. B. Julien (in French, pp. 215–217) describes a method for testing by repeated inoculation the resistance of apple seedlings to scab [33, p. 239]. When the first two true leaves have formed they are atomized in the greenhouse under optimum conditions for the development of the disease with a spore suspension of mixed lines of the fungus. The inoculum is grown in a potato dextrose (1 per cent.) solution with filter paper. Results appear in three or four weeks.

Work on varietal resistance to *Helminthosporium sativum* in barley [see below, p. 476; 31, p. 596] conducted at the Macdonald College by J. B. Julien and R. A. Ludwig (in French, pp. 41–43) indicates the possibility of carrying out such trials in the laboratory. The most efficient medium for soil inoculum proved to be sand amended with maize flour and modified Czapek medium, which was added to a sand: soil (1:3) mixture in which the grains were sown. The height of the 10- to 15-day-old seedlings was related directly to the concentration of inoculum.

The results of the investigations carried out at the Bureau of Plant Protection, Montreal, by T. Simard (in French, pp. 64–65) from 1942 to 1946, inclusive, on the

microflora of barley grain [loc. cit.] indicate that in Quebec it is predominantly infected by *Ustilago* spp. and *H. sativum*; *H. teres*, *Alternaria*, *Cladosporium*, *Epicoccum purpurascens* [31, p. 634], and *Fusarium* spp. were also encountered, but damage caused by the last-mentioned is regarded as negligible. Seed treatments with formalin and organic mercury are justified. The author also reports (p. 66) that the examination of barley spikes infected with black spot [17, p. 448], harvested in 1944, 1945, and 1947, showed that 70 per cent. of them and 75 per cent. of the seeds were infected with *Fusarium* (mostly *F. poae*), while the corresponding figures for *H. sativum* were under 50 per cent. and 12 per cent. The low figures for the latter may have been due to the antagonism between the two fungi which has been observed in culture.

A survey of diseases occurring in the strawberry and raspberry growing areas of south-western and eastern Ontario was made by A. T. Bolton (pp. 202–205) in 1950. The most serious diseases of raspberries [32, p. 323] in this area are spur blight [*Didymella applanata*: 30, p. 15], which was very severe on red raspberries in the Leamington area, and anthracnose [*Elsinoe veneta*: 33, p. 38], present on all varieties except Cuthbert; careful and thorough cultural methods appear to be effective in decreasing fungus diseases. Leaf scorch [*Diplocarpon earliana*: 33, p. 163] of strawberries caused considerable damage of economic importance. Though Premier is resistant [see below, p. 490], it is susceptible to leaf blight [*Dendrophoma obscurans*: loc. cit.; 32, p. 25] and suffers severely. Root rot [cf. 31, p. 561; 32, p. 200, and below, p. 489] caused more damage than any of the foliage diseases. It seems to be correlated with winter injury.

Smith (W. P. C.), Hardie (M.), & Lowe (B. N.). **Plant diseases. Early blight or target spot of Potatoes. Black spot (anthracnose) of Grapes.**—*J. Dep. Agric. W. Aust.*, 3rd Ser., 2, 3, pp. 355–360, 6 figs., 1953.

Early blight of potato (*Alternaria solani*) is widespread in Western Australia, [*R.A.M.*, 20, p. 593], especially on crops dug in autumn and early summer. The disease is greatly favoured by warm, humid weather. In two spraying experiments conducted in September, 1952, in the South Coogee area, four applications of nine treatments were given at 12-day intervals. Effective control was achieved only with zineb (used in proprietary form dithane Z-78) at the rate of 2 lb. in 100 gals. Treated potato foliage persisted until three weeks after the unsprayed foliage had completely withered. Yields were increased by 30 per cent., or approximately four tons per acre, the average yields of tubers from unsprayed plots being, respectively, 40 lb. and 48·7 lb., and for plots sprayed with zineb, 50·3 and 60·7. Proprietary zineb fungicides are not yet available commercially in Australia.

Black spot of grapes (*Elsinoe ampelina*) is both widespread and serious in Western Australia. It may occur on any part of the current season's growth and can be carried over from season to season by affected parts, such as tendrils, which have escaped notice. In control experiments [cf. 33, p. 11] carried out at Upper Swan in 1952 with four new fungicides, five applications were made, dormant (at bud swell), when shoots were 2–4 in. long, before flowering, and after fruit set. The results showed that S.R.406 [captan], thiram, and ziram yielded a very high percentage (92, 90, 93 per cent., respectively) of clean bunches, compared with 65 per cent. for Bordeaux mixture.

Annual Report of the Agricultural Experiment Stations, Florida, for the year ending June 30, 1952.—310 pp., 26 figs., 1 diag., 4 graphs, [? 1953].

In this report [cf. *R.A.M.*, 33, p. 71] W. B. Tisdale, W. D. Moore, and G. Swank state that isolates of *Rhizoctonia* and *Trichoderma* obtained from diseased snap bean [*Phaseolus vulgaris*] plants in Broward county showed differences in

cultural characters. The growth of certain *Rhizoctonia* isolates was retarded by that of other isolates, while some of the *Trichoderma* isolates completely overran the *Rhizoctonia* mycelium and apparently killed it [cf. 30, p. 452; 32, p. 498]. When sand in pots was inoculated with the fungi before planting snap beans the pathogenicity of *Rhizoctonia* was reduced by *Trichoderma* in some, though not all, combinations of isolates [cf. 32, p. 277]. A field experiment in Broward county demonstrated that the longer the interval between ploughing-in green organic matter and the sowing of snap beans the lower was the incidence of damping-off and *Rhizoctonia* root rot.

Materials giving good control of damping-off and red root [*Corticium solani*, *Pythium* sp., and *Fusarium* sp.] of celery [33, p. 10] when mixed with the soil were arasan SF, Robertson copper, spergon, and Mathieson 290, in that order.

J. R. Large reports that in 1951 the addition of 1 qt. summer oil to 100 gals. ziram spray plus 2 lb. 15 per cent. wettable parathion gave as good a degree of control of pecan scab [*Cladosporium effusum*: 33, p. 269] (93 per cent.) as the standard Bordeaux mixture plus parathion (92 per cent.). A hydraulic sprayer was more effective than a mist sprayer.

According to P. Decker and C. W. Anderson, 200 more chilli pepper (*Capsicum frutescens*) seed lots from the Southern Regional Plant Introduction Station, Experiment, Georgia, have been added to the testing programme for resistance to the chilli viruses occurring in Florida [cf. 33, p. 72]. Progeny of crosses between collections resistant to or tolerant of either tobacco mosaic virus or cucumber mosaic virus No. 1 [cf. 33, p. 277] or both and California Wonder [30, p. 416] were kept for testing in 1953.

H. N. Miller states that the fumigants dowfume MC-2, chlorobromopropene, and dibromobutene gave 95 to 100 per cent. control of *Pythium* root rot of Chinese evergreen [*Aglaonema modestum*]. *Rhizoctonia* rot of camellia cuttings [27, p. 126] was reduced from 54 to 15 per cent. by propagation under conditions of a continuous water mist and normal outdoor light intensity.

Observations by P. Decker, A. T. Wallace, and T. E. Webb on the virus infection of yellow lupins [cf. 33, p. 232] grown from seed from apparently healthy and diseased plants indicated that the disease may be seed-borne but may also be spread from plant to plant during the growing season. Several lupin species grown for observation appeared to be resistant to mildew [*Erysiphe polygoni*: 29, p. 87] and showed no virus symptoms.

H. N. Miller reports that during the winters of 1950 and 1951 China asters in a commercial planting at Tampa showed striking chlorotic leaf patterns comprising concentric rings, oakleaf patterns, and wavy lines, apparently due to a ring-spot virus.

A. H. Eddins states that chloranil (4 lb. 48 per cent. wettable), stabilized chloranil (2 lb. 50 per cent.), nabam-zinc sulphate (2 qt.-1 lb.), and phygon XL-N (1 lb.), each in 100 gals. spray, gave good control of cabbage downy mildew (*Peronospora parasitica*) [33, p. 63] in beds where 20 per cent. of the foliage of untreated seedlings was killed.

G. Swank reports that the best control of celery early blight (*Cercospora apii*) was secured by the following (in descending order of efficiency): ziram and ferbam (1 lb. each) alternated weekly with 4 lb. tribasic copper sulphate; 4 lb. tribasic alternated weekly with dithane D-14 plus $\frac{3}{4}$ lb. 36 per cent. zinc sulphate; $\frac{3}{4}$ lb. 36 per cent. zinc sulphate plus 2 qt. dithane D-14 or plus 2 qt. parzate; $1\frac{1}{2}$ lb. manzate; 2 lb. ferbam; 4 lb. tribasic copper sulphate; and 6–4–100 Bordeaux mixture, all in 100 gals. spray per acre. Copper materials, ziram, and ferbam gave some control of pink rot (*Sclerotinia sclerotiorum*) [32, p. 7] on the same plots. Cucumber downy mildew (*Pseudoperonospora cubensis*) was best controlled by 2 lb. manzate, 2 qt. parzate plus $\frac{3}{4}$ lb. 36 per cent. zinc sulphate, dithane D-14 plus 1 lb. manganese

sulphate, 2 lb. dithane Z-78, and 3 lb. captan in that order. Of nine treatments tested for the control of the disease on cantaloupes the best was a combination of 1 qt. dithane D-14, ½ lb. zinc sulphate, and 2 lb. tribasic copper sulphate; there were 55·3 lb. cantaloupes per 40-ft. row as against 12·8 lb. on the untreated plot.

Francine E. Fisher, reporting on diseases of citrus pests, states that *Myiophagus* sp. [30, p. 270] caused the heaviest mortality of scale insects [*Lepidosaphes beckii* and *Chrysomphalus aeonidum*] in unsprayed groves in July. Yellow disease of young scales, with which *Hirsutella besseyi* [loc. cit.] is associated, was prevalent during periods of crawler predominance, causing about 50 per cent. mortality. There was some evidence that lime residues inhibit these fungi, the effect probably being mechanical. *Entomophthora* sp. was widespread on *Paratetranychus citri* [31, p. 116] during autumn and winter, 1951–52. Hyphal bodies resembling those of yellow disease of young scales were found in *Typhlodromus* sp. and of *Entomophthora* in *Amblyseius quadripilus*. Laboratory observations have confirmed that snails (*Drymaeus dormani*) feed on sooty mould [*Capnodium* spp.].

Further studies by E. F. Hopkins, K. W. Loucks, and A. W. Cooner on the control of citrus fruit decay by the dowicide A-hexamine method were concerned with improving its efficiency. Proper application of this treatment followed by cold storage appeared to give the best results with tangerines.

Experiments by J. M. Walter again clearly demonstrated the effectiveness of nabam plus zinc sulphate (2 qts.–¾ lb.) and zineb (2 lb.), applied twice weekly in wet weather, in controlling *Helminthosporium* leaf blight of maize [*H. turcicum*].

Wilcox (J. B.), Knight (J. R.), & Bless (A. A.). **Bioelectric potentials of tumor-infected plants.**—*Plant Physiol.*, 28, 3, pp. 545–549, 3 figs., 1953. [Received June, 1954.]

Measurements of the bio-electric potentials of pot-grown tomato plants inoculated with *Phytomonas* [*Bacterium*] *tumefaciens* [see next abstract], carried out in the Department of Physics, University of Florida, showed that the potential was consistently negative on the side where the tumour appeared, the difference becoming evident about seven days before the tumour was visible.

Rack (K.). **Untersuchungen über die Bedeutung der Verwundung und über die Rolle von Wuchstoffen beim bakteriellen Pflanzenkrebs.** [Studies on the importance of injury and on the function of auxins in bacterial crown gall.]—*Phytopath. Z.*, 21, 1, pp. 1–44, 18 figs., 1 diag., 1953.

The following reasons are adduced in support of the author's view, based on experimental studies at Mainz-Marienborn, Germany, and information from 101 references, that mechanical injury, leading to new cell formation, is a necessary preliminary to the development of crown gall (*Pseudomonas* [*Bacterium*] *tumefaciens*) [cf. *R.A.M.*, 28, p. 382 *et passim*]. No tumours were produced on unwounded plants of *Kalanchoe blossfeldiana* and *K. daigremontiana* notwithstanding the presence of numerous bacteria in the intercellular spaces of the leaves (introduced by infiltration) for three months, even when optimal conditions were provided by infiltration of nutrient solutions and expressed sap of the hosts. The neoplasms appearing in the intact indentations of young *K. daigremontiana* leaves arise in areas of tissue injured by the normal growth processes incidental to the differentiation of adventitious buds.

In addition, the damage inflicted on *K. daigremontiana* leaves, previously inoculated with *B. tumefaciens*, by scorching, dry ice, or cauterization with normal potassium hydroxide solution may act as a stimulus to tumour formation. Neither exposure of naked protoplasm nor the intracellular occurrence of the bacteria appears to be essential to crown gall development. The infiltration of 0·02 per

cent. heteroauxin [31, p. 321; cf. 33, p. 19] into older leaves failed to modify their normal resistance to crown gall. Overgrowths are produced on *K. daigremontiana* by heteroauxin at a temperature of 31° C., which does not permit the formation of bacterial tumours [5, p. 348; 26, p. 382]. The results of tests with a bacterial strain of attenuated virulence [22, p. 198] lent no support to the two-phase theory of Braun and Laskaris that in the development of crown galls there is a preliminary inductive phase, which can be initiated by avirulent strains as well as by virulent, followed by a multiplicative phase in which the degenerate cells increase. It is postulated that the cellular disjunction and meristematic resumption consequent upon injury are important factors in a specific predisposition to the disease. Physiological senescence of the cells, possibly associated with the disappearance from the host of unknown materials termed 'co' substances (*Amer. J. Bot.*, 29, pp. 598–606, 1942; 33, p. 839, 1946), culminates in immunity from crown gall, insensitivity to heteroauxin, and delay in callus formation.

The author criticizes intensively Braun's 'entity' (unity) theory [*R.A.M.*, 31, p. 423], which postulates that complex and slow-growing tumours result finally from single degenerating cells which gradually acquire a cytoplasmic unity.

Clark (F. E.). **The generic classification of the soil Corynebacteria.**—*Int. Bull. bact. Nomencl. Tax.*, 2, 1, pp. 45–56, 1952.

In this discussion of the taxonomic position of the genus *Corynebacterium* [cf. *R.A.M.*, 32, p. 12; 33, p. 102 and next abstract] it is recommended that many species of soil and plant origin, recently placed in this genus, should be excluded.

Patel (M. K.), Bhatt (V. V.), & Kulkarni (Y. S.). **Some phytopathogenic bacteria requiring reinvestigation.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 116–120, 1953.

The authors discuss the species of phytopathogenic bacteria in five genera requiring investigation, recommending that species placed in *Corynebacterium* [see preceding abstract] but shown to be non-pathogenic, Gram-variable, or motile should be separated from the plant pathogens. *Erwinia* spp. not conforming to the previous definition [*R.A.M.*, 32, p. 12], including *E. cassavae*, *E. mangiferae*, and *E. vitivora*, should also be dropped from the genus. *Pseudomonas mors-prunorum* and *Xanthomonas manihotis*, *X. cannae*, and *X. lespedezae* are considered to be wrongly placed in their respective genera.

Kristensen (H. R.). **Virussygdomme hos korn.** [Virus diseases of cereals.]—*Tidsskr. Planteavl*, 56, 4, pp. 660–683, 1953.

Western Europe is stated to be still largely free from the viroses affecting cereals in other parts of the world, but the possibility of their introduction, e.g., into Denmark, cannot be excluded, and a summary is accordingly given of the symptomatology and other important features of eight such diseases with a view to their immediate recognition and notification. Most of the 56 titles in the bibliography have been noticed in this *Review*.

Fletcher (D. G.), Lambert (E. B.), Nagler (K. M.), & Stakman (E. C.). **The origin and extent of a regional spore shower of Wheat stem rust.**—Abs. in *Phytopathology*, 43, 9, p. 471, 1953.

The appearance of primary infections of *Puccinia graminis* on wheat in eastern North and South Dakota, north-western Iowa, and western Minnesota between 24th and 28th June, 1952, indicated that a relatively uniform uredospore shower, of an estimated weight of 600 lb., fell on this area of some 40,000 square miles earlier in the month. The spores apparently came from central Oklahoma and

south-central Kansas, where they were dispersed into the air by harvesting operations. The spore load per culm in the area of origin was computed at 0·5 mg., resulting in a total production for the region of 4,000 tons of spores.

Suneson (C. A.). **Effect of stem rust on the yield of Wheat.**—*Agron. J.*, 46, 3, pp. 112–114, 1954.

Essentially isogenic (back-crossed) wheat varieties differing in genetic resistance to stem rust [*Puccinia graminis*: see next abstract] were compared in 1947, 1951, and 1952 at the Department of Agronomy, University of California, Davis [*R.A.M.*, 23, p. 477]. Yield reductions due to the disease in the susceptible Baart ranged from 25 to 47 per cent. and in the moderately susceptible Baart 38 from 6 to 20, whereas the resistant Baart 46 sustained no loss from this cause. Since the medium resistance of Baart 38, representing the predominant reaction of the California wheat acreage, has sufficed to check the natural development of stem rust epiphytotics since 1940, commercial breeding for virtual immunity would not appear to be immediately necessary.

Heyne (E. G.) & Johnston (C. O.). **Inheritance of leaf rust reaction and other characters in crosses among Timstein, Pawnee and RedChief Wheats.**—*Agron. J.*, 46, 2, pp. 81–85, 1954.

In further studies at the Kansas Agricultural Experiment Station on the inheritance of wheat leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 33, pp. 77, 416], the spring variety Timstein was found to be resistant in the adult stage to the physiologic races prevalent in the State [loc. cit.], but the winter wheats Pawnee and RedChief were susceptible. In the seedling stage Timstein was resistant to races 5, 9, 15, 44, and 126, Pawnee to 9, and RedChief to all five.

Timstein appeared to carry one major recessive factor and one or more modifying factors for adult plant resistance to *P. triticina*. The one major factor in Pawnee for seedling resistance to race 9 was non-allelic and at least partially epistatic to the Timstein factor. Timstein further carried one major recessive factor and one or more minor factors controlling its seedling reaction to the five races. The Pawnee factor for resistance to race 9 was not associated with awn development or seed colour, but was linked with the Timstein factor for adult plant resistance with a recombination value of 21·8±7·8 per cent. These resistance factors were located on chromosome X [32, p. 369] (cf. also *Genetics*, 33, pp. 123–124, 1948). The Timstein seedling reaction to *P. triticina* was correlated with adult plant response to leaf rust but not with stem rust [*P. graminis*: see preceding abstract] reaction, awn development, seed coat colour, or winter injury.

Winter wheat lines have been obtained from crosses between the three experimental varieties which are resistant to the races of *P. triticina* predominating in Kansas and also to those of *P. graminis* except 15B [*R.A.M.*, 33, p. 416 and next abstract].

Hotson (H. H.). **Some chemotherapeutic agents for Wheat stem rust.**—*Phytopathology*, 43, 12, pp. 659–662, 1953.

The results of greenhouse experiments at the University Farm, St. Paul, Minnesota, demonstrated that certain sulpha compounds, including the sodium salt of sulphadiazine, sulphapyrazine, sulphapyridine, and gantrisin (3,4,dimethyl-5-sulphanilamide-isoazole), applied to seedlings as post-infection sprays at a concentration of 3·5 to 5 lb. per acre, are effective in the control of race 15B of wheat stem rust (*Puccinia graminis*) [cf. *R.A.M.*, 33, p. 341 and preceding abstract] on the Little Club, Spelmar, Vernal, and Khapli varieties. Similar results were obtained with races 17, 38, and 56. The action of the sulpha drugs on *P. graminis*

is similar to that on other organisms (Henry, R. J.—*Publ. Josiah Macy Fdn* 2, pp. 1–72, 1944). When the treatment was followed by the application of equivalent amounts of *p*-amino benzoic [vitamin H'] or folic acid [vitamin Bc] the rust resumed growth, presumably in response to the favourable influence on its metabolism of these vitamins.

Hassebrauk (K.). **Die physiologische Spezialisierung des Weizenbraunrostes Puccinia triticina Erikss. in der Deutschen Bundesrepublik während der Jahre 1950/51.** [Physiologic specialization in Wheat brown rust, *Puccinia triticina* Erikss., in the German Federal Republic during the years 1950–1.]—*Z. PflZücht.*, 32, 2, pp. 132–136, 1953.

Physiologic specialization in wheat brown rust (*Puccinia triticina*) in central Europe, especially Germany, was not investigated between 1938 [*R.A.M.*, 29, p. 92] and 1950 [32, p. 612]. In 1951, 152 samples were submitted to the Brunswick branch of the Biological Institute. Race 1 (= UN1 according to Chester's unified numeration scheme [26, p. 239]) predominated, occurring in 79 samples in 1950 and 134 in 1951; race 11 (= UN10) was found 12 times and twice, respectively. In 1950 one collection contained race 53 (= UN1) and in 1951 race 93 (= UN11) was detected three times. UN1 also includes the former race 16, UN10 races 14 and 26, and UN11 race 17. Since 1935 race 1 has evidently been extending its range at the expense of the other races formerly represented in Germany.

Podhradszky (J.). **Resistance and biotype tests with two species of Wheat bunt: Tilletia foetida (Wallr.) Liro and Tilletia triticoides Săvul.**—*Növénytermelés*, 1, 1, pp. 93–102, 1952. [Abs. in *Hung. agric. Rev.*, 2, 2, p. 11, 1953.]

None of the 30 local varieties and strains of wheat tested by means of artificial infection for resistance to bunt (*Tilletia foetida* and *T. triticoides*) in Hungary [*R.A.M.*, 32, p. 673] was resistant. The results indicate that Hungarian wheat varieties are on the whole more susceptible to *T. foetida* than to *T. triticoides*. Isolates of the former from the south-eastern part of the country differed considerably in their pathogenicity to ten differential varieties from those from the other parts. Similarly, some difference was observed in isolates of *T. triticoides* from two different places.

Riehm (E.). **Der Zwergbrand (Tilletia brevifaciens G. W. Fischer).** [Dwarf bunt (*Tilletia brevifaciens* G. W. Fischer).]—*Z. PflKrankh.*, 61, 3, pp. 129–139, 1954.

In the compilation of an up-to-date survey of the literature on dwarf bunt (*Tilletia brevifaciens*) of wheat the author consulted 46 contributions, nearly all of which have already been noticed in this *Review* [*R.A.M.*, 33, p. 222 *et passim*].

Bever (W. M.). **Further studies on physiologic races of Ustilago tritici.**—*Phytopathology*, 43, 12, pp. 681–683, 1953.

Eight new physiologic races of *Ustilago tritici* were isolated from 56 collections of wheat loose smut made during 1947 in Texas, Missouri, Nebraska, and States to the eastward, bringing the total so far described to 19 [*R.A.M.*, 27, p. 227]. The shift in the prevalence of individual races appears to be caused by the development of new wheat varieties with different germ plasm. Kawvale withstands infection by all the races and should serve as an excellent parent in breeding for resistance to loose smut [33, p. 415].

Chinn (S. H. F.), Ledingham (R. J.), Sallans (B. J.), & Simmonds (P. M.). **A mechanism for the control of common rootrot of Wheat.**—*Phytopathology*, 43, 12, p. 701, 1953.

At the Laboratory of Plant Pathology, University of Saskatchewan, Saskatoon,

Canada, the addition of soy-bean meal to soil naturally contaminated by or inoculated with *Helminthosporium sativum* [*R.A.M.*, 33, p. 139] reduced the incidence of infection on wheat seedlings as compared with that developing in similar soil without the meal. By means of a special slide technique it was demonstrated that the conidia of the fungus usually remain dormant in the soil and constitute a potential source of infection; the soy-bean meal stimulated their germination, which was followed by lysis of the germ-tubes, presumably through the action of antibiotic substances. The application of this method before sowing wheat is considered to offer a prospect of combating common root rot. A full report is promised.

Bockmann (H.). **Untersuchungen über die Anfälligkeit verschiedener Weizensorten gegen die Halmbruchkrankheit des Getreides.** [Investigations on the susceptibility of different Wheat varieties to the straw-breaking disease of cereals.]—*Z. Pflanzenz.*, 32, 4, pp. 361–372, 3 figs., 1953.

A tabulated survey is given of the results of field trials carried out from 1949 to 1952 at the Kiel-Kitzeberg (Schleswig-Holstein) branch of the German Biological Institute to determine the reactions of some important commercial wheat varieties to inoculation with *Cercosporella herpotrichoides* [*R.A.M.*, 32, p. 245]. Resistance was not observed. Susceptibility was most pronounced in varieties with a strong natural inclination to lodging, such as Strubes Frühweizen, Strubes Gen.v.Stocken, Heine II neu, Heine IV, and Carsten V. Among the less susceptible to both straw-breaking and lodging were Carsten VI, Heine VII, Rimpaus Bastard, Rimpaus Braun, and Criewener 192. Susceptibility to *C. herpotrichoides* or lodging was not necessarily paralleled by yield reductions, the genes controlling this character evidently being influenced by environmental factors, notably tillering and density of stand.

Riebesel (G.). **Bemerkungen über das Auftreten weisser Mutterkörner.** [Observations on the occurrence of white ergots.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 5, 7, p. 109, 2 figs., 1953.

Every year in the cereal breeding garden at Ollesheim-über-Düren, Germany, the sclerotia of *Claviceps purpurea* [*R.A.M.*, 33, p. 290] develop in profusion on rye [32, p. 181], wheat×rye, and wheat×couch grass [*Agropyron repens*]. In 1953 well-developed albino forms were observed for the first time on rye and wheat, elongated on the former, short and thick on the latter, over an area of about 100 sq. m., their numbers exceeding those of the normal dark type.

Zoltán (K.) & Gábor (F.). **Tájekozódó élettani vizsgálatok porüszöggel (Ustilago nuda (Jens.) Rostr.) fertőzött őszi Arpák télrekészüléséről.** [Preliminary studies on the physiology of winter-hardening of Barleys infected with loose smut (*Ustilago nuda* (Jens.) Rostr.).]—*Növénytermelés*, 2, 3, pp. 130–133, 1 fig., 2 graphs, 1953. [Russian, English, and German summaries.]

Inoculation experiments with *Ustilago nuda* on the Beta 40 barley variety at the Research Institute for Crop Production, Martonvásái, Hungary, resulted in about 50 per cent. infection, determined by the microscopic methods of Simmonds [*R.A.M.*, 25, p. 258] and Popp [30, p. 461 and next abstract]. There was a slight increase in the carbohydrate (sugar) content of diseased plants, so that the decrease in winter-hardiness associated with loose smut cannot be attributed to a fall in carbohydrate. On the other hand, measurements of gas exchange revealed a correlation between the incidence of infection and an increase in the uptake of carbon dioxide, representing an anabolic type of gas exchange. These observations are considered to lend strong support to Sempio's theory of metabolic resistance to plant diseases [30, p. 240].

Popp (W.) & Cherewick (W. J.). **An improved method of inoculating seeds of Oats and Barley with smut.**—*Phytopathology*, 43, 12, pp. 697–699, 1 diag., 1953.

A method for the inoculation of barley seed with *Ustilago hordei* and *U. nigra* and of oats with *U. avenae* and *U. kolleri*, developed at the Laboratory of Plant Pathology, Winnipeg, Canada, and presenting advantages over those in current use [*R.A.M.*, 16, p. 737; 22, p. 201], has already been briefly described [32, p. 371]. In this amplified, tabulated account further details are given of the operations involved and the application of the method to four varieties each of barley and oats. The average percentage of smutted heads secured on barley from 1948 to 1952 was 33·6, compared with 32·9 for the dry spore method on dehulled seed and 4·6 on normal seed, and 17·3 for the spore suspension method; the corresponding figures for oats were 52·1, 44, 5·5, and 28·8.

Derick (R. A.). **Oats in Canada.**—*Publ. Dep. Agric. Can.* 554 (revised November, 1953), 23 pp., 7 figs., 1954.

This bulletin, summarizing the results of experiments on oats carried out by the Canadian Experimental Farms Service and dealing with various aspects of the cultivation of the crop, includes sections on diseases and their control (pp. 9–15) and on lodging (pp. 17–18), as well as notes on the chief varieties at present grown in Canada [*R.A.M.*, 29, pp. 142, 457; 30, p. 101; 31, p. 52; 32, p. 667, *et passim*]. Of these, Mabel, developed from a cross between O.A.C.72 M.C.214 and Early Ripe M.C.213, has some resistance to crown rust [*Puccinia coronata*: loc. cit.; cf. 33, p. 344] and smuts [*Ustilago avenae* and *U. kolleri*: 32, p. 667]. Shefford, from a cross between Roxton [29, p. 457] and Mabel is resistant to *U. kolleri* and has the same resistance to crown rust as its parents. Torch, from the cross Nakota × (Hajira × Joanette), is resistant to the smuts and to the prevailing races of stem rust [*P. graminis*: 32, p. 667; 33, p. 291].

Fischbeck (G.). **Über die Grundlagen der Resistenzzüchtung gegen Puccinia graminis avenae Erikss. u. Henn. und ihre Berücksichtigung im Haferzüchtungsprogramm der University of Minnesota.** [On the foundations of breeding for resistance to *Puccinia graminis avenae* Erikss. & Henn. and their consideration in the Oats breeding programme at the University of Minnesota.]—*Z. PflZücht.*, 32, 2, pp. 143–152, 1953.

Most of the 39 contributions to the literature on breeding oats for resistance to *Puccinia graminis avenae*, which were consulted by the author during a year's investigation of the subject at the University of Minnesota, have been noticed from time to time in this *Review* [*R.A.M.*, 29, p. 612; 30, p. 314].

Finkner (R. E.), Atkins (R. E.), & Murphy (H. C.). **Inoculation techniques for crown rust of Oats.**—*Agron. J.*, 45, 12, pp. 630–631, 1 fig., 1953.

The following is an outline of the modified procedure adopted of recent years at the Iowa Agricultural Experiment Station to expedite the handling of large populations of oat seedlings in preparation for inoculation with crown rust [*Puccinia coronata*: *R.A.M.*, 32, p. 75]. A sterilized soil, sand, and peat mixture was placed in 14- by 20-in. wooden flats, thoroughly watered, and left to stand overnight. Next day 25 rows of 17 holes, each $\frac{1}{2}$ in. deep with a spacing of $\frac{3}{4}$ in., were punched by means of a marking board, the seeds sown, covered with a light layer of soil, and watered. When the seedlings were in the first-leaf stage the flats were placed in a walk-in moist chamber with a capacity of 15 flats, supplied with steam heat for temperature control and fog nozzles to produce high humidity. The seedlings were first sprayed with an aqueous solution of dreft (10 ml. per gal.) [32, p. 415], using the high pressure Sure Shot sprayer, which produces a very fine mist

by means of carbon dioxide cartridges. They were then dusted with a mixture of 1 ml. rust spores and 50 ml. talcum powder (or a larger proportion of the former if fresh material was not available), applied with a De Vilbiss powder insufflator No. 119. After this operation, which was usually performed in the late afternoon, the fog nozzles were turned on until the following morning, when the chamber was slightly opened to permit gradual drying of the plants.

This method has given excellent results, producing uniform infection and enabling rust reactions to be read after about 12 to 14 days; over 6,000 seedlings could be handled conveniently in one inoculation group.

Brown (A. R.) & Miller (J. H.). **A comparative study of Helminthosporium sativum Pam., King and Bakke and H. victoriae Meehan and Murphy on Oats.** —*Agron. J.*, 46, 2, pp. 63–67, 3 figs., 1954.

Since 1946 two species of *Helminthosporium* besides *H.* [*Pyrenophora*] *avenae* have been observed on oats in Georgia [cf. *R.A.M.*, 33, p. 345]. One with chiefly fusiform, up to 12- (average 8-) septate, dark olivaceous conidia, 60 to 110 by 19 to 32 μ, which causes a seedling root rot of oats, wheat, and barley, is referred provisionally to *H. sativum* [see above, pp. 467, 474]. The other, with predominantly curved, up to 11- (average 8-) septate, yellowish-brown to pale olivaceous conidia, 60 to 120 by 11 to 22 μ, the agent of seedling blight and culm rot of Victoria-derived oats only, is assigned to *H. victoriae* [loc. cit.]. The latter species was found in only one Victorgrain field in 1952, and extensive search revealed no trace of it in 1953.

The local isolate of *H. sativum* agrees with one supplied by H. H. Christensen from Minnesota in conidial characters, as well as in the lesions induced on Trebi barley, but differs in both respects from the type species. In inoculation experiments the *H. victoriae* isolates were severely pathogenic only to oats of Victoria parentage, causing little or no damage to the Bond and Rustproof selections and no infection on Trebi barley. On the other hand, *H. sativum* attacked all the five varieties of oats used in the tests as well as barley.

Derick (R. A.). **A survey of varietal resistance to black stem (Septoria avenae) in Oats in eastern Canada.**—*Plant Dis. Reptr*, 38, 2, pp. 85–87, 1 fig., 1954. [Multilithed.]

In a survey carried out by the Canadian Department of Agriculture, Ottawa, to discover possible sources of resistance to black stem (*Septoria avenae*) [*Leptosphaeria avenaria*: *R.A.M.*, 32, p. 248; 33, p. 419] among a large number of oat varieties, the following were classed as resistant at five locations in 1953: C.D.3820, Sais, and C.D.1007 (all *Avena strigosa*); C.D.5022 and C.D.4090 from Wales and C.D.1030 from Germany (all *A. sativa*); C.D.1024 (*A. nuda*); C.D.1017 and C.D.1019 (*A. nuda* [×] *brevis*); and C.D.920 (*A. brevis*).

Hunter (J. G.) & Vergnano (Ornella). **Trace-element toxicities in Oat plants.** —*Ann. appl. Biol.*, 40, 4, pp. 761–777, 1953.

In further studies at the Macaulay Institute for Soil Research, Craigiebuckler, Aberdeen, on trace-element toxicities in oat plants grown in sand culture [*R.A.M.*, 32, p. 427; 33, p. 178], excess nickel, cobalt, chromium, copper, zinc, manganese, molybdenum, and aluminium in nutrient solutions produced (*a*) chlorosis and (*b*) other symptoms specific to the particular element. The symptoms of all, except sometimes those of chromium and aluminium, were associated with high concentrations of the element in the leaf tissue. Those of nickel, chromium, copper, and molybdenum were associated with reduced nitrogen content in the plant. Nickel, cobalt, chromium, zinc, and manganese increased the concentration of phosphorus in the tissues, whereas aluminium decreased it.

Aluminium reduced the intensity of toxic symptoms produced by nickel, while copper reduced the leaf necrosis, though not the nickel content of the leaf tissue; it is considered that one factor in nickel toxicity may, possibly, be inhibition of one or more functions of copper. The other elements slightly increased nickel chlorosis, while some also increased necrosis.

The (descending) order of activity of the elements in producing chlorosis (aluminium omitted owing to solubility difficulties) was: nickel, copper, cobalt, chromium, zinc, molybdenum, and manganese.

In determining trace-element toxicities in soils, diagnosis may satisfactorily be made in pot experiments with oats. A soil-sand mixture which gives adequate drainage (usually 7 soil to 3 sand) is prepared and low levels of nutrients (nitrogen 50, phosphorus 25, potassium 50, calcium 250 p.p.m.) added to part of the mixture and higher levels (200, 100, 200, 1,000 p.p.m.) to the remainder. Oat seeds are sown and the plants grown for about 40 days after germination. Of four Aberdeenshire and two American ultra-basic soils examined in this way, four contained toxic concentrations of nickel and one a toxic concentration of chromium.

De Bruin (T.). **Twee kiemschimmels van Mais.** [Two germ fungi of Maize.]—*Tijdschr. PlZiekt.*, 59, 6, pp. 254–255, 1953. [English summary.]

At the Agricultural College, Wageningen, Holland, maize seeds were sown, without previous disinfection, in soil of high moisture content (at least 70 per cent. of the maximum water-holding capacity) which had carried a previous maize crop. After exposure to temperatures of 10° and 19° C. for eight and two days, respectively, the boxes were maintained at 28°. Germination and emergence were poor [cf. *R.A.M.*, 33, p. 345]. A *Pythium* of the *debaryanum* type and a *Fusarium* close to *F. culmorum* were isolated from a number of the rotted seeds, and used in soil inoculation experiments on two lots of seed, one of which was treated with arasan [loc. cit.].

The *Pythium* caused necrosis and disorganization of the coleorhiza and rootlets and in some cases destroyed the untreated seeds before penetrating them, which did not occur until three or four days after sowing. Evidently, therefore, toxins secreted by the fungus diffuse through the pericarp. According to the severity of infection, the seeds either did not germinate at all or produced only a coleoptile, the dark brown radicle not exceeding $\frac{1}{2}$ cm. in length. Arasan-treated seeds germinated normally but the roots were attacked during their passage through the soils and rotted away; growth was rapidly resumed, however, on the formation of lateral roots.

The *Fusarium* proved capable of penetration through any part of the ungerminated seed, establishing itself in the scutellum and rotting the tissue. In such cases, representing 50 to 80 per cent. of the total, germination was entirely precluded; where only the plumule or rootlet was involved some growth was made but normal seedlings were not produced. Arasan failed to prevent slight infection of the radicle, which was of little consequence, however, in the further development of the seedling.

From these observations it appears that arrested growth of seedlings from treated seed in the field is attributable mainly to *Pythium* infection.

Sabet (K. A.). **A new bacterial disease of Maize in Egypt.**—*Emp. J. exp. Agric.*, 22, 85, pp. 65–67, 1 pl., 1954.

In the summer of 1953 many maize varieties, including inbreds, single-crosses, double-crosses, and open-pollinated ones, growing near Cairo, Egypt, were attacked by a severe bacterial disease. Symptoms included a brownish, longitudinal discoloration at the base of the stalks, softening of the stem tissues and ear sheaths, and premature withering of the lower leaves. The roots were reddish and cracked

easily. Ears with infected sheaths contained either no grains or malformed ones. Pathogenicity tests were carried out using bacteria isolated from diseased areas, by inserting suspensions of this inoculum into the stalks of five- to six-weeks-old potted maize plants by means of sterile pipettes. Within 48 hours symptoms appeared and in three days the plants collapsed.

The pathogenic bacterium was of the coliform, soft-rot type, but in cross-inoculation tests *Bacterium atrosepticum* [*Erwinia atroseptica*], *E. carotovora*, and *B.* [*E.*] *aroideae* were not able to infect maize. The rot produced by the maize bacterium is identical with that induced in other hosts by *E. carotovora* and the two organisms are similar in morphological, cultural, and biochemical characters. It is proposed that the name *E. carotovora* f. sp. *zeae* n.f. is given to the maize pathogen.

Jenkins (Merle T.), Robert (Alice L.), & Findley (W. R.). **Recurrent selection as a method for concentrating genes for resistance to Helminthosporium turcicum leaf blight in Corn.**—*Agron. J.*, 46, 2, pp. 89–94, 1954.

The efficiency of recurrent selection as a procedure for the concentration of genes for resistance to leaf blight (*Helminthosporium turcicum*) of maize was studied at the Division of Cereal Crops and Diseases, Beltsville, Maryland [*R.A.M.*, 32, p. 182], in nine groups of progenies, four grown in 1949 and five in 1950. Each comprised a resistant inbred line, a susceptible Corn Belt line, the reciprocal cross, the back-cross to the Corn Belt line (or F_2 generation of the cross), and three successive generations of recurrent selection for leaf blight resistance [cf. 32, p. 619].

In 24 out of a total of 27 comparisons for efficiency of this selection method the differences were positive, indicating enhanced resistance from its application. Of the positive differences 16 were highly significant and five significant, so that the procedure may be regarded as extremely effective for two generations at any rate. No explanation could be found for the high significance of two of the three negative differences.

Porter (R. H.). **Sorghum seed-treatment test in Colorado.**—*Plant Dis. Reptr*, 38, 2, p. 88, 1954. [Multilithed.]

In a seed-treatment trial for the control of covered kernel smut (*Sphacelotheca sorghi*) on Sharon Kafir and Leoti sorgo sorghum at Colorado Experiment Station, Fort Collins, in 1953, fungicides giving complete control included all those found effective in similar experiments at two other stations [*R.A.M.*, 33, p. 292] with the addition of orthocide (slurry, 1 oz. per bush.) and the liquids P-5025 (1 oz.), vancide 51 (4), and setrete (0·5).

Coleman (O. H.) & Stokes (I. E.). **The inheritance of resistance to stalk red rot in Sorghum.**—*Agron. J.*, 46, 2, pp. 61–63, 1954.

In a cross between the Rex and Sart sorghum varieties, susceptible and resistant, respectively, to *Colletotrichum graminicola* at the U.S. Sugar Field Plant Station, Meridian, Mississippi [*R.A.M.*, 33, p. 150], resistance was shown to be controlled by the single factor pair (Lsls) in which resistance was dominant. The reactions to the stalk red rot (Lsls) and leaf anthracnose (Ll) phases of the disease were closely linked, with a cross-over value of 9·57 per cent. in the coupling phase, but were inherited independently of seed coat colour.

Andrade (A. C.) & Puzzi (D.). **Ensáio de fungicidas para controlar as manchas fúngidas dos Citrus.** [Test with fungicides to control the fungus spots of Citrus.]—*Biológico*, 19, 8, pp. 144–148, 2 graphs, 1953.

Particulars are given of experiments performed in a 15-year-old sour orange orchard in São Paulo, Brazil, for the control of *Sphaceloma* [*Elsinoe*] *fawcetti*

[*R.A.M.*, 30, p. 434] and *Diaporthe citri* by two applications of ten fungicidal treatments, using a John Beam motor sprayer delivering on an average 6 l. per tree at 250 lb. pressure.

Bordeaux mixture (1 per cent.) [loc. cit.; cf. 29, p. 293; 32, p. 184] was the most effective against both pathogens, reducing the incidence of *E. fawcetti* from 67·3 to 37·1 per cent. and that of *D. citri* from 26·5 to 1·8. Almost equal to Bordeaux mixture in toxicity to *E. fawcetti* was 0·5 per cent. copper compound (copper oxychloride, 40·4), but none of the other fungicides gave more than mediocre results. Against *D. citri* zinc coposil (0·5 per cent.), copper compound, and crag 658 (0·25 per cent.) followed Bordeaux mixture in efficiency with percentages of 6·8, 7·1, and 9, respectively.

Dadant (R.). **Contribution à l'étude de Oospora citri aurantii Ferraris parasite des Agrumes en Nouvelle-Calédonie.** [A contribution to the study of *Oospora citri-aurantii*, parasite of Citrus in New Caledonia.]—*Rev. Path. vég.*, 32, 2, pp. 87–92, 1 fig., 1953.

During recent years the production of citrus fruits, particularly oranges and mandarins, has declined considerably in New Caledonia as a result of rotting due to *Oospora citri-aurantii* [*R.A.M.*, 32, p. 304; cf. 33, p. 338], following skin punctures caused by the moth *Othreis fullonica* [*O. fullonia*]. One or two months before maturity infected fruits fall in two or three days. Losses may be as high as 95 per cent. of the crop. The arthrospores of the fungus are often present in the insect's proboscis. While the insect is not essential for infection, early infections and epiphytotics appear to be dependent on it.

Control, under local conditions, is indicated by means of a systemic insecticide, if a suitable one can be found. Meantime, all rotting fruit lying on the ground should be removed and destroyed.

Smith (P. F.) & Specht (A. W.). **Heavy metal nutrition and iron chlorosis of Citrus seedlings.**—*Plant Physiol.*, 28, 3, pp. 371–382, 2 figs., 1953. [Received June, 1954.]

The responses of sweet orange and mandarin seedlings to various amounts of copper, zinc, manganese, and iron [*R.A.M.*, 33, p. 26] were investigated at Orlando, Florida, and Beltsville, Maryland, in solution and vermiculite cultures (pH 4). The first three metals caused root injury and iron chlorosis by interfering with the upward translocation of iron. This development was prevented by the addition of chelated iron, which, however, was toxic to the leaves at a concentration of 5 p.p.m. iron, unless the amount of any of the other metals was increased. Copper accumulated in the roots without an increase in transfer to the rest of the plant, while manganese and zinc both accumulated in the roots and were distributed in greater amounts in the plant. Evidently these heavy metals influence one another in plant nutrition and should be studied as a group [cf. above, p. 476].

Turrell (F. M.) & Boyce (A. M.). **Effect of quality and intensity of solar radiation on injury of Lemon fruit by sulphur treatment in the field.**—*Plant Physiol.*, 28, 2, pp. 151–176, 3 figs., 10 graphs, 1 diag., 1953. [Received June, 1954.]

In a field experiment conducted in 1942 at the University of California Citrus Experiment Station, Riverside [cf. *R.A.M.*, 29, p. 470], lemon trees of a mixed population were dusted with elemental sulphur; some were then enclosed in cheesecloth tents; fruits on some of the uncovered trees were covered by ultraviolet filters. Undusted trees were treated similarly. Another lot was sprayed with lime-sulphur (plus zinc sulphate) and left uncovered.

Fruits exposed to direct sunlight of normal intensity were generally injured, though foliage, treated or untreated, sustained very slight damage. Lime-sulphur

caused the greatest percentage of sulphur burn, which was distinct from sunburn. Elemental sulphur dust increased the percentage of sunburn. Reduction of insolation reduced both types of burn, but elimination of ultraviolet radiation did not.

Pasinetti (L.). **Metabolism of Citrus fruits in relation to some dermatoses.**—*Ann. fitopat.*, 1, pp. 15–22, 1952. [Abs. in *Chem. Abstr.*, 47, 20, p. 10637, 1953.]

Studies at the University of Palermo, Italy, yielded evidence that the brown spots and oleocellosis [*R.A.M.*, 28, p. 626] developing on oranges stored at low temperatures are attributable primarily to unsuitable nutritional and other environmental factors, such as temperature, humidity, and carbon dioxide content of the atmosphere. Furthermore, the respiratory rate of damaged fruits was found to be abnormally high.

Darley (E. F.) & Wilbur (W. D.). **Phytophthora trunk rot of Washington Palms.** —Abs. in *Phytopathology*, 43, 9, pp. 469–470, 1953.

A species of *Phytophthora* tentatively identified as *P. parasitica* has been isolated from a soft, spongy basal rot of the trunks of *Washingtonia filifera* at Palm Springs, California. The leaves wilt and the palms die in two to three months. Infective material splashed on the trunks by irrigation water appears to encourage infection through injuries made by the removal of old leaves to improve the look of the palms. When one-, eight- and 14-year-old palms were inoculated in this way the seedlings were killed in about 10 days and the older plants developed typical trunk rot and died in two or three months.

Machado (A.) & Castaño (J. J.). **Modalidades de cultivo del Cafeto y su relación con la incidencia del mal rosado (Corticium salmonicolor B. y Br.).** [Methods of cultivating Coffee bushes and their relation to the incidence of pink disease (*Corticium salmonicolor* B. & Br.).]—*Bol. inf. Colombia*, 5, 51, pp. 33–34, 1954. [Mimeographed.]

In general, Bourbon coffee bushes in Colombia are more susceptible to pink disease (*Corticium salmonicolor*) [*R.A.M.*, 33, p. 228] than the 'national' or 'typical' kinds. However, incidence in both varieties, grown experimentally at the National Centre for Coffee Investigations, Chinchina, was practically nil when the bushes were left in their natural, multiple-stem state, but amounted to 10 per cent. in the national and 46 per cent. in Bourbon when pruned to a single stem and 5 and 32 per cent., respectively, in bushes pruned to the double-stem system.

Castaño (J. J.). **Reproducción artificial de los sintomas lesionales típicos de la 'llaga negra' o 'podredumbre negra' radicular del Cafeto.** [Artificial reproduction of the typical lesion symptoms of 'black pest' or 'black root rot' of the Coffee bush.]—*Bol. inf. Colombia*, 5, 51, p. 32, 1954. [Mimeographed.]

Punctate spots, black vascular streaks, and typical lesions developed on dead coffee roots ten months after being inoculated in the laboratory with cultures of *Rosellinia* isolated from lesions on the roots of coffee bushes attacked in the field in Colombia by black root rot [*R.A.M.*, 32, p. 480]. These results definitely establish the role of the pathogen in causing this disease. Typical symptoms of black root of cassava [cf. 30, p. 96] were reproduced in about two months by inoculation with *Rosellinia* sp.

Parra (J.). **Controles biológicos en suelos de la serie 230. Informe de progreso del proyecto experimental N° QA-10.** [Biological control in soils of series 230. Progress report on experimental project No. QA–10.]—*Bol. inf. Colombia*, 5, 51, pp. 34–39, 2 figs., 1954. [Mimeographed.]

Further pot experiments on the bean yields of Casa Blanca coffee seedlings

receiving various major and minor elements [cf. *R.A.M.*, 33, p. 351], involving four soil samples taken from a coffee-growing area west of Pereira, Colombia, gave results similar to those obtained previously [loc. cit.]. The major elements in various combinations tended to increase yields significantly but the minor elements had little or no effect.

KNIGHT (R. L.). **The genetics of blackarm resistance. X. The gene B_7 from Stoneville 20. XI. Gossypium anomalum.**—*J. Genet.*, 51, 3, pp. 515–519, 1953; 52, 2, pp. 466–472, 1954.

In further studies in this series [cf. *R.A.M.*, 32, p. 431] the resistance of the Upland cotton, Stoneville 20 (*Gossypium hirsutum*) [32, p. 374], to blackarm (*Xanthomonas malvacearum*) [33, p. 423] was ascertained to be due to a major dominant gene, B_7, fortified by minor genes. B_7 was transferred to Sudan Sakel (*G. barbadense*), in which it has a weaker expression than B_2 [33, p. 229]. Resistance in *G. anomalum* ($n = 13$; *B* genom), a wild species that grows in the Sudan in a wide belt between the 5 and 20 in. isohyets, is controlled by a single recessive gene, b_8. Transferred to *G. arboreum* this gene imparted a degree of resistance somewhat lower (grades 3 to 7) than that typical of *G. anomalum* (grades 2 to 5). The extra resistance of *G. anomalum* is attributed to factors for rapid leaf hardening evolved in response to the requirements of the xerophytic environment of the species. The gene b_8 is closely linked with R_2^{os}, which interacts with R_3^{qo} to produce the large petal spot always present in *G. anomalum*.

CHRISTENSEN (J. J.), HENDERSON (L.), & ARAGAKI (M.). **Dissemination of Septoria linicola.**—Abs. in *Phytopathology*, 43, 9, p. 468, 1953.

Septoria linicola [*Mycosphaerella linorum*] is readily spread to new localities by means of contaminated flax seed and the fragments of diseased material adhering to it [*R.A.M.*, 10, p. 384; 33, p. 296]. In Minnesota most seed lots are thus infected, some of them having 50 to 75 pycnidia per sq. mm., each of which may contain between 1,000 and 20,000 spores. Local dispersal of the fungus is effected by means of splashing rain drops and strong winds in wet weather but not by air currents. It has been shown repeatedly that at least 20 species of insects are important agents in the dissemination of *M. linorum*, their legs and bodies becoming covered with spores under humid conditions. Flax plants colonized with infested insects developed symptoms of pasmo disease. The pathogen may also be distributed by spiders, frogs, birds, mice, and dogs.

QUINIONES (S. S.) & ORILLO (F. T.). **Blight of Kenaf.**—*Philipp. Agric.*, 36, 5, pp. 235–250, 5 figs., 1952. [Received February, 1954.]

Blight of kenaf (*Hibiscus cannabinus*) caused by *Phoma sabdariffae* [cf. *R.A.M.*, 32, p. 188] was first observed in the Philippines during August, 1951, damaging the leaves, shoots, and blossoms at the Central Experiment Station, College of Agriculture, Laguna. In 1952 it affected about 50 per cent. of the crop in the experimental plots of the Department of Agronomy. Small, watersoaked, circular or irregular lesions with distinct, pale green borders develop, particularly on young leaves, and enlarge rapidly during cool, moist weather to 3 to 5 cm. in diameter. Eventually the whole leaf is blighted. In the laboratory inoculated leaves usually fell before the appearance of pycnidia but in the field fructifications developed profusely before this. Infection generally commences at the apex of a shoot or a few cm. below and spreads downwards to the third or fourth node. The shoots are shrunken, greyish-black, and dotted with pycnidia. Eventually they droop and hang at the junction of the diseased and healthy portions of the stem. Pycnidiospores germinate on the open flowers causing rotting of the petals and, under favourable conditions, infection of the remaining floral tissues and the ovary.

P. sabdariffae was isolated readily from infected leaves and shoots. It grew well on acid agar media. Pycnidiospores germinated within 8 to 12 hours on potato dextrose agar at 27° to 28° C. They remained viable for eight months on diseased leaves and shoots and for ten months on agar slants.

Pathogenicity to *H. cannabinus* var. *vulgaris* and *H. c.* var. *viridis* was established by inoculating 32- and 20-day-old seedlings with mycelial fragments. The fungus was reisolated from infected leaves and shoots of both species. The new varieties *simplex*, *ruber*, and *purpureus* were as susceptible as the two above. Roselle (*H. sabdariffa*) was also highly susceptible, developing symptoms similar to those on kenaf. The disease is particularly prevalent during the wet months (August to October, inclusive). Dissemination is by rain, wind, insects, and on the seeds of diseased plants. Infection occurs largely through leaf and shoot injuries caused by insects and other agents. The fungus overwinters on plant parts left in the field.

Control measures comprise a two- or three-year crop rotation excluding *H. sabdariffa*, strict sanitation in the field, and the use of selected or disinfected seed (1 in 1,000 mercuric chloride solution). Preliminary experiments demonstrated some measure of control by spraying with 2 to 3 per cent. 530 spraycop (53 per cent. metallic copper) and 0·2 to 2 per cent. fermate.

Tramier (R.). **Maladies de l'Urena lobata au Moyen Congo.** [Diseases of *Urena lobata* in the Middle Congo.]—*Cot. et Fibr. trop.*, 8, 2, pp. 240–256, 4 figs., 4 graphs, 1953.

The author prefers to use *Macrophoma urenae* for the fungus causing stem canker of *Urena lobata* in the Middle Congo [*R.A.M.*, 32, p. 189] instead of *Stagonospora urenae* [loc. cit.], having observed no septate conidia. A description is given [without a Latin diagnosis] of the perfect state, *Physalospora urenae* n.sp., which develops only on old lesions or on stems killed by an attack on the collar. The black, spherical perithecia, appearing about three weeks after the climax of an outbreak, measure 196 to 280 by 184 to 280 μ; the dimensions of the few hyaline, claviform asci, some with and others without paraphyses, are 92 to 136 by 13 to 21 μ, and those of the four to eight uniseptate, ellipsoid to fusiform ascospores 18 to 25 by 16 to 11 [? 21] μ. In the disease syndrome secondary manifestations of uncertain origin are a watery rot of the stem, angular leaf spots, and cankers resulting from mechanical injury.

Preliminary results in the development of varieties resistant to the fungus are encouraging. In the meantime seed should be dusted (after shelling) with an organic mercurial, crop rotation and early harvesting practised, and stem residues and debris burnt. Of primary importance is the avoidance of injuries, through which the pathogen might enter.

Baxter (L. W.) & Plakidas (A. G.). **Dieback and canker of Camellias.**—Abs. in *Phytopathology*, 43, 9, p. 466, 1953.

Canker and die-back of camellia twigs and larger shoots [*R.A.M.*, 33, p. 71] is a widespread and often destructive disease throughout the southern United States. The results of a three-year investigation [? in Louisiana] showed that *Glomerella cingulata* is the agent of the disease, causing typical symptoms in inoculation experiments on 20 varieties of *Camellia japonica* and two of *C. sasanqua*. Infection occurs only through wounds, the usual points of ingress in nature being the scars left by abscissing leaves in the spring; the application of conidia to such injuries and to those induced by artificial removal of the leaves resulted in the development of characteristic features. The imperfect state is a *Colletotrichum*, as demonstrated by the presence of setae, not a *Gloeosporium* [loc. cit.].

Armstrong (J[oanne] K.) & Armstrong (G. M.). **Caryophyllaceae susceptible to the Carnation-wilt Fusarium.**—Abs. in *Phytopathology*, 43, 9, p. 465, 1953.

Three varieties of carnation, several of sweet william [*Dianthus barbatus*] and garden pink [*D.* spp.], and *Lychnis chalcedonica* were found to be susceptible to monospore isolates of *Fusarium* [*dianthi*] in the United States [*R.A.M.*, 31, p. 553]. Cross-inoculation tests with the fungus on 29 species and varieties of plants outside the Caryophyllaceae and with 24 wilt-inducing species of *Fusarium* from some of these hosts on carnation and *D. barbatus* gave negative results [cf. 33, p. 28].

Williamson (C. E.). **Anther smut disease of Carnation found in metropolitan area.** —*Bull. N.Y. St. Flower Grs* 103, p. 3, 1954.

Carnation anther smut [*Ustilago violacea*: *R.A.M.*, 30, p. 468] was observed on 10 to 35 per cent. of Noroton White carnations in some greenhouse establishments on Long Island and in the metropolitan area of New York [? in 1954].

Kassanis (B.). **A virus latent in Carnation and Potato plants.**—*Nature, Lond.*, 173, 4414, pp. 1097–1098, 1954.

In the course of serological investigations of carnation virus diseases at Rothamsted Experiment Station it was found that some symptomless stocks carried a virus that was transmissible by sap inoculation and by *Myzus persicae* to *Dianthus barbatus*, which also remained symptomless. The viruliferous sap loses its infectivity when diluted by more than 1 in 1,000, the thermal inactivation point is 60° to 65° C., and the longevity *in vitro* is two to three days at 20°. Particles in the sap of infected *D. barbatus* plants are rod-shaped and about 10mμ wide. These properties closely resemble those of the potato paracrinkle virus in King Edward potatoes [*R.A.M.*, 29, p. 427]. Further tests showed that apparently healthy stocks of other potato varieties, e.g., Gladstone, Craigs Alliance, Majestic, Arran Victory, Epicure, and U.S. Seedling 41956, also contain an antigen related to the carnation virus. It was also transmitted to other plant species but the only one reacting with visible symptoms was sugar beet, the older leaves of which became yellow.

Dimock (A. W.) & McFadden (L. A.). **New bacterial disease affects Chrysanthemums.**—*Bull. N.Y. St. Flower Grs* 104, pp. 2–4, 3 figs., 1954.

This is a more popular account of information on the *Erwinia chrysanthemi* disease of chrysanthemums in the United States than that previously published [*R.A.M.*, 33, p. 355].

Forsberg (J. L.). **A summary of 1952 Gladiolus disease control studies in Illinois.** —*Bull. Ill. Flor. Ass.* 147, pp. 1–4, 1953. [Abs. in *Chem. Abstr.*, 47, 15, p. 7721, 1953.]

Seven pre-planting treatments were tested for the control of *Fusarium* [*oxysporum* f. *gladioli*: *R.A.M.*, 33, p. 296] on the corms of four gladiolus varieties in Illinois, including 15-minute dips in 1 oz. new improved ceresan or aagrano 350 in 3 gals. water, with the addition in both cases of two tablespoonsful of dreft; 50 ml. phemox stock solution (prepared by dissolving 10 gm. powder in 500 ml. diacetone alcohol and adding 20 ml. tergitol 7 wetter) in 3 gals. water; and velsicol 50-CS-46 (30 ml. in 3 gals. water); and the dusts CC experimental fungicide 5379 and arasan. On Picardy all the treatments produced increased flower and corm yields and freedom from infection by *F. o.* f. *gladioli*, but the differences relative to the controls were not statistically significant for phemox and arasan. The yields of Spotlight were materially increased by all the treatments.

Calogreen dust [27, p. 476] was generally the most effective of the various dusts and dips tested against scab [*Bacterium marginatum*: 33, p. 425] on seven varieties,

but injured the corms of some. From the over-all results of these two experiments velsicol 50–CS–46 appears to be one of the most promising materials tested of recent years.

New improved ceresan alone, used as a pre-planting dip, gave better control of *Curvularia* [32, p. 433; 33, p. 155] on Silver Wings corms than in combination with vancide 51.

Van Katwijk (W.). **Mozaeik bij Gouden Regen.** [Mosaic of Golden Rain.]—*Tijdschr. PlZiekt.*, 59, 6, pp. 237–239, 3 figs., 1953. [English summary.]

The author recapitulates the available information on laburnum mosaic virus. He considers that the report of a variegation in England by Masters (*Gdnrs' Chron.*, 7, p. 730, 1877), and other cases of infectious variegation [*R.A.M.*, 14, p. 462; 23, p. 439] are of the same disease. Observations since 1948 have revealed the prevalence of the disease on *Laburnum anagyroides* and *L. vossii* [*L. watereri*] in Holland, where the results of preliminary experiments by grafting infected on healthy material confirmed its virus origin. *L. alpinum* also proved to be susceptible. Symptoms exactly like those of laburnum mosaic virus are also displayed by *Lespedeza formosa*. Aphid control should be practised and all propagating material taken exclusively from mosaic-free plants.

Challenger (S.). **Diseases of Alpines.**—*Quart. Bull. alp. Gdn Soc.*, 22, 2, pp. 131–151, 1954.

A key to the fungus and virus diseases of garden alpines is presented, based on the external symptoms. Brief notes based on the literature (43 references) indicate in popular terms the probable causes of the diseases and methods of control.

Beaumont (A.). **Diseases of Lupins.**—*Gdnrs' Chron.*, Ser. 3, 135, 3514, p. 181, 1954.

Of the diseases attacking garden lupins (*Lupinus polyphyllus*) in Great Britain, the less common include root rot due to *Aphanomyces* sp. and crown rot and wilt (*Fusarium culmorum*); infected plants should be destroyed and a new site chosen. Root rot caused by *Armillaria mellea* is usually associated with a diseased hedge or the remains of apple or elm trees, which should be eradicated, the soil well turned during the summer, and root remains removed. Stem rot (*Sclerotinia sclerotiorum*) [*R.A.M.*, 22, p. 161] generally attacks isolated plants, which should be removed immediately. Mildew (*Erysiphe polygoni*) [29, p. 415] is readily controlled by sulphur dusts or sprays.

D'Oliveira (B.). **Nota sobre a especialização fisiológica do Uromyces renovatus Syd.** [Note on the physiologic specialization of *Uromyces renovatus* Syd.]—*Broteria*, 22 (49), 3, pp. 130–137, 1953. [English summary.]

Four physiologic races of *Uromyces renovatus* on three lines of lupin [*R.A.M.*, 29, p. 568], a white, a blue, and a yellow, were differentiated in the course of experiments performed in Portugal between 1940 and 1950, but a larger number was demonstrated by a further series carried out during 1952–3 with uredo- and aecidiospores of the rust. The newer races attacked certain selections which had hitherto seemed likely to provide suitable resistant breeding material.

Pohjakallio (O.). **The effect of isopropyl phenylcarbamate on Clover-stem rot fungus (Sclerotinia trifoliorum).**—*Maataloust. Aikakausk.*, 25, pp. 54–60, 1953. [Finnish. Abs. in *Chem. Abstr.*, 48, 7, p. 4164, 1954.]

In experiments at the University of Helsinki, Finland, the addition of isopropyl phenylcarbamate to Henneberg agar at a concentration of 0·5 gm. per l. or to

clover extract nutrient agar at 0·2 gm. inhibited mycelial growth and sclerotial formation by *Sclerotinia trifoliorum* [*R.A.M.*, 32, p. 435 and cf. next abstract]. Sprayed on the leaves of inoculated red clover plants, the chemical conferred only temporary protection in the laboratory and was ineffectual in the field.

Pape (H.). **Bestehen Möglichkeiten zur Bekämpfung des Kleekrebses?** [Do possibilities exist for the control of Clover canker?]—Reprinted from *Neue Mitt. Landw., 1954*, 5, 2 pp., 2 figs., 1954.

The possibilities of combating clover canker [rot] (*Sclerotinia trifoliorum*) [cf. preceding abstract] in Germany [*R.A.M.*, 33, p. 410] are discussed in the light of the author's experience at Kiel-Kitzeberg [Schleswig-Holstein: cf. 23, p. 22]. The fungus is not restricted to clover, occurring also on vetches, field peas, beans [*Phaseolus vulgaris*], broad beans, lupins, and a number of non-leguminous plants, including carrot, swede, and rape, while it has recently been observed on many weeds such as *Plantago* spp., *Geranium* spp., dandelion, *Senecio vulgaris*, *Sonchus oleraceus*, *Cirsium arvense*, shepherd's purse [*Capsella bursa-pastoris*], *Thlaspi arvense*, field pansy, *Myosotis* spp., and *Stellaria media*.

The following suggestions are made for the control of the pathogen. Clovers of native origin are preferable to those of foreign (especially southern [European]) provenance. In localities where the disease is severe red clover may profitably be replaced by lucerne or a mixture of grasses and the more resistant clovers (e.g., white and alsike), while the cultivation of crimson clover, which is subject to very heavy infection, should be discontinued. Other preventive measures are late sowing (end of August or early September) and the checking of unduly luxuriant growth by timely mowing or grazing. A judicious system of crop rotation is of primary importance in control, a suitable sequence consisting of a truck crop, e.g., potato, followed by a summer cereal and then by clover, or the clover may be sown intermingled with winter rye or barley. Heavy amendments of nitrogen (especially organic) should be avoided, but it may be applied in a readily soluble form as a light, spring top-dressing. The sclerotia should be buried as deeply as possible in the course of ploughing to prevent germination. Thorough eradication of weeds which are liable to infection is indispensable.

Graves (C. H.). **Incidence of the Red Clover vein mosaic virus in Wisconsin Clovers.**—Abs. in *Phytopathology*, 43, 9, p. 473, 1953.

A study of the incidence of red clover vein mosaic virus, which induces pea stunt [*R.A.M.*, 31, p. 98], on red, alsike, and Ladino clovers, yellow and white sweet clovers [*Melilotus officinalis* and *M. alba*], and black medick [*Medicago lupulina*] was conducted in the pea-growing areas of Wisconsin in 1951 and 1952. In Dodge county during 1952 the average incidence of this virus in red clover fields ranged from nearly 12 per cent. in the early part of the season to about 22 in the late and along roadsides from 18 to 22 per cent., the corresponding figures for other [unspecified] viruses being 2 and 5 to 8, respectively, without significant seasonal changes. In alsike and sweet clover stands the virus was somewhat less prevalent, while ladino clover and *M. lupulina* were very slightly affected.

Schicke (P.). **Frühgilbe und Inkarnatkleeröte, zwei nichtparasitäre, pathologische Erscheinungen am Inkarnatklee (Trifolium incarnatum L.).** [Early yellowing and Crimson Clover reddening, two non-parasitic pathological manifestations on Crimson Clover (*Trifolium incarnatum* L.).]—*Z. Pflanzenz.*, 32, 2, pp. 167–192, 1953.

A detailed account is given of investigations at the Phytopathological Institute of Bonn University on the so-called 'early yellowing' and 'reddening' of crimson

clover, two independent physiogenic disorders which have been associated during the past two decades with progressively increasing deterioration in the yield and quality of crimson clover crops in the Rhine Valley.

Early yellowing is characterized by premature chlorosis and desiccation, which lead to a substantial fall in seed production. It is most conspicuous on vigorous, apparently healthy plants growing under the most favourable conditions. Physiological processes akin to those of natural maturity in annuals or of autumnal leaf fall are responsible.

Reddening, which appears before flowering, is due to intense anthocyanin production in the leaves and results in dwarfing and reduced seed yields. It arises from important metabolic and physiological aberrations, such as obstruction of the passage of assimilates in the leaves, an increase of osmotic pressure, and diminished transpiration.

Poverty of the soil in nutrients or water and parasitic agents can be excluded as causes of these disorders.

Braun (H.) & Kröber (H.). **Beobachtungen über eine Stengelschwärze an Luzerne.** [Observations on a stem-blackening of Lucerne.]—*NachrBl. dtsch. PflSch-Dienst* (*Braunschw.*), *Stuttgart*, 5, 6, pp. 83–84, 1 fig., 1953.

Attention is drawn to the occurrence of black stem (*Ascochyta imperfecta*), hitherto almost unknown in Germany [*R.A.M.*, 33, p. 206], in some lucerne crops between Bonn and Cologne, in the Rhine Valley, during the early summer of 1952.

Bean (J.), Brian (P. W.), & Brooks (F. T.). **Physiologic races of the brown rust of Brome grasses.**—*Ann. Bot., Lond.*, N.S., 18, 70, pp. 129–142, 1954.

Nineteen cultures of brown rust were isolated from brome grasses (*Bromus* spp.) and maintained at the Botany School, University of Cambridge. Their infection reactions (uredospore stage only), studied on a series of *Bromus* spp. over a period of 14 years, revealed that five physiologic races were involved, restricted to different sections of the genus; only No. 4 infected *B. erectus*. All are considered to belong to the group-species *Puccinia dispersa* [*R.A.M.*, 25, p. 347], but from their host range *P. bromina* [loc. cit.] (races 1 and 2), *P. symphyti-bromorum* [loc. cit.; 31, p. 146] (race 4), and possibly *P. bromi-maximi* [25, p. 347] (race 5) appeared to be represented. All the races were remarkably stable in their infection types and host range. After being cultured for 164 generations over a period of eight years on *B. arduennensis* races 2a and 5 were indistinguishable in their host reactions from the original cultures from which they were obtained.

Shay (J. R.), Dayton (D. F.), & Hough (L. F.). **Apple scab resistance from a number of Malus species.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 348–356, 2 figs., 1953. [Received May, 1954.]

At the Agricultural Experiment Stations of Illinois, New Jersey, and Purdue University, hybrids between various *Malus* species resistant to *Venturia inaequalis* [*R.A.M.*, 33, p. 239 and following abstracts] and susceptible apple varieties were tested for scab reaction in the greenhouse and field. The resistance of *M. prunifolia* variety 19651 was inherited in a complex manner, resistant F_1 seedlings back-crossed to susceptible varieties giving from 46 to 76 per cent. resistant seedlings. *M. atrosanguinea* clone 804 gave an F_1 with 41 per cent. resistant seedlings, and the back-cross 46 to 79 per cent.; it is believed that in two or three back-cross generations new and commercially desirable fruit characters will be combined with scab resistance. Nearly half the greenhouse-resistant F_1 plants from *M. zumi calocarpa* developed infection in the field. The results suggest that in *M. baccata* resistance is due to a single major factor and in *M. micromalus* to two.

Hough (L. F.), Shay (J. R.), & Dayton (D. F.). **Apple scab resistance from Malus floribunda Sieb.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 341–347, 2 figs., 1953. [Received May, 1954.]

Immunity from apple scab (*Venturia inaequalis*) [see preceding and next abstracts] in clone 821 of *Malus floribunda* is controlled by a single dominant gene, which has been transmitted through the second back-cross generation with commercial varieties in co-operative investigations by the Agricultural Experiment Stations of Illinois, New Jersey, and Purdue University, Indiana, resulting in apples combining field immunity with desirable fruit characters.

Dayton (D. F.), Shay (J. R.), & Hough (L. F.). **Apple scab resistance from R12740–7A, a Russian Apple.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 334–340, 1 fig., 1953. [Received May, 1954.]

In a co-operative breeding programme carried out at the Agricultural Experiment Stations of Illinois, New Jersey, and Purdue University, a Russian apple, R12740–7A, was used as a source of resistance to *Venturia inaequalis* [see preceding abstracts]. A large percentage of the F_1 from crosses with commercial varieties had the poor fruit qualities of the resistant parent, and it is estimated that two or three more back-crosses will be necessary to combine resistance with desirable commercial characteristics. A tentative hypothesis based on the limited genetic data so far available is that R12740–7A has the constitution AaBbXxYyZz, in which either A or B confers resistance, each having a value of 100, while that of X is approximately 75, and Y and Z 35 each. Plants with X combined with Y or Z would be resistant while those with X alone, and Y or Z alone or combined would be susceptible. The results obtained by crossing with an apple heterozygous for a single major resistance factor support this hypothesis.

Pelletier (R. L.) & Keitt (G. W.). **Venturia inaequalis (Cke.) Wint. VI. Amino acids as sources of nitrogen.**—*Amer. J. Bot.*, 41, 4, pp. 362–371, 1 fig., 6 graphs, 1954.

Further studies in this series [cf. *R.A.M.*, 27, p. 480] in the Department of Plant Pathology, University of Wisconsin, Madison, demonstrated that DL-alanine, L-arginine, L-glutamic acid, glycine, L-proline, L-tyrosine, casein hydrolysate, and a mixture of 19 amino acids were good sources of nitrogen as estimated by the *in vitro* growth of monoascosporic lines of *Venturia inaequalis*. The amino acid nutrition seems to be of potential importance in relation to the pathogenicity of the fungus and the resistance of the host (apple) [cf. 33, pp. 240, 432].

Van Katwijk (W.). **Rozet, een nieuwe virusziekte bij Appels.** [Rosette, a new virus disease of Apples.]—*Tijdschr. PlZiekt.*, 59, 6, pp. 233–236, 6 figs., 1953. [English summary.]

In 1950 and 1952 a hitherto unknown disease affecting Beauty of Boskoop apple trees was observed in the province of Gelderland, Holland, and in the summer of 1953 the same condition developed in a nursery in Zeeland. The abnormally small and misshapen leaves (6 by 4½ cm. as compared with 10 by 8½ cm. on healthy trees) formed rosettes and the branches were sterile. The symptoms were transmitted by grafting to healthy trees of the same variety and probably also to Jonathan, thereby indicating that a virus was concerned in their production. The name proposed for the disease is apple rosette (*Pirus* virus 6 or *Acrogenus rosettae*).

Kessler (H.) & Stoll (K.). **Versuchsergebnisse bei der Kaltlagerung von Apfelsorten.** [Experimental results in the cold storage of Apple varieties.]—*Annu. agric. Suisse*, 67, 8, pp. 1157–1183, 1953.

Further observations on the development of various physiological disorders

(including scald) and fungal rots on stored apples in Switzerland [*R.A.M.*, 29, p. 263] are tabulated, with descriptive notes for some of the more important varieties. The paper concludes with a table (pp. 1176–1182) showing the storage temperatures recommended, the duration of the safe holding periods, and the susceptibility to storage disorders of the individual varieties.

Hutchins (L. M.), Cochran (L. C.), Turner (W. F.), & Weinberger (J. H.). **Transmission of phony disease virus from tops of certain affected Peach and Plum trees.**—*Phytopathology*, 43, 12, p. 691–696, 1953.

Contrary to the results of previous experiments indicating that phony peach virus [*R.A.M.*, 32, p. 198] is localized in the roots [18, p. 322], transmission tests at the Plant Industry Station, Beltsville, Maryland, showed that it may also exist in the tops of diseased plum and peach trees, especially the former. Transmission could be effected only from certain trees or particular branches of a given tree. The upward movement of the virus appears to be very slow. In the various graft combinations the woody cylinder of the infected scions was kept alive until new growth started so as to permit transmission of the virus, which is believed to have failed in the past through neglect of this precaution. The incubation period of phony peach virus in large trees inoculated from tops ranged from two to four years compared with 1½ to two for small ones and 18 months for root-inoculated trees, the symptoms on which were more pronounced during the early stages of the disease than those induced by scion infection.

Wolfe (H. R.) & Anthon (E. W.). **Transmission of the western X-disease virus from sweet and sour Cherry to Peach by two species of leafhoppers.**—*J. econ. Ent.*, 46, 6, pp. 1090–1092, 1953.

At the Tree Fruit Experiment Station, Wenatchee, Washington, during 1951–2, the western X-disease virus [strain of peach X-virus] was transmitted from Lambert and Napoleon sweet cherries and Montmorency sour to healthy Lovell peach seedlings by single adults of *Colladonus geminatus* and *Scaphytopius acutus* [*R.A.M.*, 31, p. 22]. In one instance infection was also conveyed from Napoleon to a three-year-old Elberta peach by *C. geminatus*. In two out of five transmissions from sour cherry to peach the vectors acquired the virus as nymphs. In 15 tests involving transmission from sour cherry to peach, the minimum latent period of the virus in *S. acutus* did not exceed 45 days, while the maximum may have been as much as 65, depending on the exact moment of acquisition during the time of feeding on the source.

Berend (I.). **Report on researches of the years 1948–49 and –50, concerning control of apoplectic dieback of the Apricot.**—*Ann. Inst. Prot. Plant., Budapest*, 5 (*1950*), pp. 251–258, 1952. [Abs. in *Hung. agric. Rev.*, 2, 2, p. 11, 1953.]

Apoplexy of apricot trees [*R.A.M.*, 27, p. 139] was severe in Hungary from 1948 to 1950, causing some 36 to 60 per cent. tree losses in some parts of the country. To control the disease it is advisable to plant trees of medium height in flat areas and low-stemmed or wild ones on hillsides. In addition, moderate pruning, crop regulation, and modern agrotechnical methods are recommended.

Da Gama (M. V.) & De Freitas (F. C.). **Uma deficiência de manganésio.** [A deficiency of manganese.]—*Agron. lusit.*, 15, 3, pp. 249–257, 1953. [English summary.]

Various fruits cultivated in sandy soils in the Cartaxo district of Portugal, including vine, apricot, plum, peach, apple, quince, blackberry, and orange, suffer from manganese deficiency, expressed by chlorosis of the leaves, with the exception

of the primary and secondary veins, which remain green. The pH of the deficient soils ranged from 6·6 to 8·2 and the average manganese content was 6·6 p.p.m., while the corresponding figures for samples in which the plants were healthy were pH 4·6 to 6·4 and 40 p.p.m. In August, 1952, effective control of the disorder on apricot and plum trees was secured by two spray applications of a manganese sulphate solution at 200 gm. per 100 l. water.

Huber (G. A.). **Technique for indexing red Raspberry plants for viruses.**—*Plant Dis. Reptr*, 38, 2, pp. 68–69, 1 fig., 1954. [Multilithed.]

A technique for the determination of viruses in field-grown red raspberry plants [*R.A.M.*, 24, p. 324; cf. 33, p. 435] is described from the Division of Horticulture, Washington State Department of Agriculture. Leaves or cane tips are transported from the field in triangular, plastic, ventilated boxes, the base of the petiole or stem being placed in water in a vial secured in a corner of the box. Ventilation holes are covered with voile. The boxes fit into racks in rows. In the greenhouse or laboratory the shoots in the boxes are infested for 144 hours with 15 to 20 virus-free aphids (*Amphorophora rubi*), which are then confined for another 144 hours on potted Cumberland black raspberry indicator plants by means of ventilated plastic bags. Virus symptoms usually appear in seven to ten days.

This method is also suitable for indexing strawberry plants.

Narasimham (K. L.), Bedford (C. L.), & Robertson (W. F.). **The effect of harvesting conditions on mold count of black Raspberries.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 36, 3, pp. 280–284, 4 graphs, 1954.

Studies on the various factors responsible for [unspecified] moulds of processed black raspberries in Michigan in 1951 and 1952 indicate that the shiny, black fruit is ideal for processing because it has the lowest mould count. Soft or partially decomposed berries, resulting from a delayed harvest, especially after rain, can be eliminated by shaking the bushes or washing the picked berries with heavy sprays of water. [This information also appears in *Diss. Abstr.*, 14, 2, p. 333, 1954.]

Deutschmann (F.). **Eine Wurzelfäule an Erdbeeren, hervorgerufen durch Phytophthora cactorum (Leb. et Cohn) Schroet.** [A root rot of Strawberries caused by *Phytophthora cactorum* (Leb. & Cohn) Schroet.] –*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 6, 1, pp. 7–9, 3 figs., 1954.

In 1952 strawberries of the Ydun variety in the Vierlanden market-gardening region of Schleswig-Holstein developed a root rot unusual in Germany, due to *Phytophthora cactorum* [*R.A.M.*, 27, p. 374], which involved 10 to 15 per cent. of a one-year-old stand covering some 600 sq. m. The diseased plants developed pronounced wilting and collapsed fairly quickly. The entire root system was discoloured and contained numerous oospores and abundant mycelium. In inoculation experiments the Ydun variety was severely attacked, whereas (in preliminary tests) Soltwedel was considerably less susceptible.

Fulton (R. H.) & Cation (D.). **Comparison of fungicides for the control of Strawberry leaf blight (Dendrophoma obscurans).**—Abs. in *Phytopathology*, 43, 9, pp. 471–472, 1953.

Experiments are reported [from Michigan] to determine the relative efficiency in the control of *Dendrophoma obscurans* on the very susceptible Robinson strawberry [*R.A.M.*, 28, p. 130] of a single treatment, when the new leaves were emerging from the crown, with an eradicant, tag 331 (½ pt. in 100 gals.), and three applications (emerging leaves, pre-, and post-bloom) of the protectants ferbam, captan, and fixed copper. The incidence of blighted leaf areas per 3 ft. of matted

row was reduced from 737 in the unsprayed plots to 15·5 by tag 331, 121·5 by ferbam, 135·8 by captan, and 192·5 by fixed copper. Tag 331 ($\frac{1}{2}$ and 1 pt.) and elgetol ($\frac{1}{2}$ and 1 gal.), applied after harvesting (about 1st August), gave 73·8, 82·2, 30, and 28·8 per cent. healthy leaves, respectively, as against 15 per cent. in the untreated plots.

Wilhelm (S.), Raabe (R. D.), & Thomas (H. E.). **Dematophora root and crown rot of Strawberry.**—*Plant Dis. Reptr*, 38, 2, pp. 72–73, 1 fig., 1954. [Multilithed.]

Rosellinia necatrix was responsible for the collapse and death of Shasta strawberry plants [*R.A.M.*, 30, p. 309] in Santa Cruz county, California, on land recently cleared of old apple trees, some of which had been killed by the same fungus. The mycelium pervaded the cortex and wood of the strawberry roots and crown bases, forming indefinite plaques of white tissue in the cambium and in moist conditions growing from the roots into the surrounding soil.

Calpouzos (L.). **Controlled sporulation of Cercospora musae Zimm. in pure culture.**—*Nature, Lond.*, 173, 4414, pp. 1084–1085, 1954.

Studies in the Atkins Garden and Research Laboratory, Cienfuegos, Cuba, showed that the critical factor controlling conidial production in cultures of *Mycosphaerella musicola* [*R.A.M.*, 28, p. 529] is genetic and not connected with the environment. Selective subculturing from single-spore isolates from banana leaves eventually produces an entire colony pure for the sporulating character. It seems probable that *M. musicola* is a heterokaryon.

Brooks (R. M.) & Olmo (H. P.). **Register of new fruit and nut varieties. List 8.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 513–526, 1953. [Received May, 1954.]

This further list of new fruit and nut varieties bred in the United States and Canada [cf. *R.A.M.*, 32, p. 386] includes the black currant variety Consort (Ottawa 396), derived from Kerry × *Ribes ussuriense*, which is immune from *Cronartium ribicola* [30, p. 508]. Two new nectarine varieties, Cavalier (V.P.I.17) from (P.I.43143 × unnamed V.P.I. peach seedling) × self, and Redchief (V.P.I.19) from (P.I.43143 × unnamed V.P.I. peach) × (P.I.63973 × unnamed V.P.I. peach), both show outstanding ability to escape infection by brown rot [*Sclerotinia fructicola*: 31, p. 243]. The peach varieties, Gage (Dwarf Elberta or Gage Elberta), which probably arose as a bud mutation of Elberta, and Ranger (U.S.D.A. B12160), from Raritan Rose × self, are fairly resistant to bacterial spot [*Xanthomonas pruni*: 33, p. 305]. Illinois Bartlett pear (probably Kieffer × Duchesse d'Angoulême) is more resistant to fireblight [*Erwinia amylovora*: 31, p. 333; 33, p. 95] than Bartlett. The strawberry variety Plentiful (Illinois 41–11), from Redstar × Pathfinder, is resistant to red stele [*Phytophthora fragariae*: 33, p. 435], leaf spot [*Mycosphaerella fragariae*: 33, p. 163], and leaf scorch [*Diplocarpon earliana*: loc. cit. and above, p. 468].

New seed treatment.—*Seed World*, 74, 4, p. 43, 1954.

Geigy SP–50, a new seed protectant (Geigy Co., Inc., New York), is recommended for use as a dust or slurry on lucerne, small seeded legumes, beans [*Phaseolus* spp.], and peas. Treatment (8 oz. is sufficient for 1 bush. of small legumes or 2 bush. of beans) reduces decay and damping-off and permits early planting.

Sisler (H. D.) & Cox (C. E.). **Effects of tetramethylthiuram disulphide on metabolism of Fusarium roseum.**—*Amer. J. Bot.*, 41, 4, pp. 338–345, 8 graphs, 1954.

Studies in the Department of Botany, University of Maryland Agricultural Experiment Station, demonstrated the necessity for an exogenous source of

inorganic nutrients and carbon for the germination and growth of washed conidia of *Fusarium 'roseum'*. In distilled water or in a basal inorganic medium they had a low, relatively constant rate of endogenous respiration; there was a manifold increase in the rate of oxygen uptake following the addition of glucose. Thiram at concentrations of 10^{-4}, 10^{-3}, and 10^{-2} moles per l. inhibited germination and the respiratory utilization of glucose [cf. *R.A.M.*, 31, p. 194]. The higher concentrations had a greater effect on oxygen uptake than the lower ones and their inhibitive effect was of longer duration. Glucose fermentation in a nitrogen atmosphere was also inhibited. The fungicide was decomposed in the presence of living fungus cells with the release of a volatile toxicant which also inhibited respiration and germination. Carbon disulphide was identified in the atmosphere over liquid media containing fungus cells and the fungicide.

Horsfall (J. G.) & Rich (S.). **Fungitoxicity of sulfur-bridged compounds.**—Abs. in *Science*, 119, 3096, p. 582, 1954.

In their paper presented at the annual meeting of the National Academy of Sciences, held at Washington, D.C., on 26th to 28th April, 1954, the authors report further work at the Connecticut Agricultural Experiment Station [cf. *R.A.M.*, 32, p. 389], in which the mechanism of the antifungal action of sulphur was studied from the action of sulphur-bridged compounds on germinating spores of *Monilinia* [*Sclerotinia*] *fructicola* [33, pp. 165, 438, and next abstract]. Diphenyl sulphide and β-nonylmercaptopropionic acid were active, but their sulphone analogues were not. Among the most active compounds were captan, 2,4-dinitrophenylthiocyanate, benzothiazolyl-2-thioglycolic acid, and diphenyl sulphide, in which the sulphur bridge is between two electronegative groups: C = O, $-CCl_3$, $-C \equiv N$, $-COOH$, or benzene ring; it may be assumed that these groups withdraw electrons from the sulphur, thus making it more reactive. Bis(2-hydroxy-5-chlorophenyl)sulphide was more toxic than bis(2-aminophenyl)sulphide, which was more toxic than diphenyl sulphide. The *o*-hydroxyl and *o*-amino groups are able, presumably, to form metal chelates with the neighbouring sulphur particles, so depriving the fungus of necessary metals.

Thanos (A.). **Effect of cycloheximide (acti-dione) on the germination of spores of several phytopathogenic fungi.**—*Diss. Abstr.*, 14, 1, p. 9, 1954.

In vitro tests at Michigan State College demonstrated the effective inhibition of spore germination in *Cladosporium cucumerinum* by actidione [*R.A.M.*, 29, p. 454] at pH 3, 4 (at 22° C.), and 6·8 (30°). The spores of *B*[*otrytis*] *cinerea* and *Ramularia* sp. were killed at 50 and 100 p.p.m., depending on the temperature and the pH of the solutions, and those of *M*[*onilia*: *Sclerotinia*] *fructicola* [29, p. 473 and preceding abstract] by 10 p.p.m. at 28° and 30° and by 25 p.p.m. at 22°, 24°, and 26°. Stimulation of germination and some distortion were observed in certain cases.

Zeumer (H.). **Methoden zur Prüfung von Pflanzenschutzmitteln LVII. Die Oberflächenspannung als Mass für die Netzfähigkeit von Spritzbrühen.** [Methods for the assay of plant protectives LVII. Surface tension as a measure for the wetting capacity of spray mixtures.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 6, 3, pp. 41–44, 1954.

The experiments herein described and the tabulated results afforded no evidence of direct proportionality between surface tension and the wetting capacity of all the spray mixtures tested at the Brunswick branch of the German Biological Institute. Thus, easily wettable leaves were less effectively wetted by certain preparations with low surface tension than they were by water. There was, however, an unmistakable general tendency towards an enhancement of wettability

with decreasing surface tension, colloidal sulphur, for instance, with a surface tension of 48·9 dynes per cm. being more efficient than wettable sulphur I (54·6), and copper oxychloride I (46·2) than copper oxychloride II (55·7). At surface tensions below about 35 dynes per cm. all the test plants were satisfactorily covered, even those normally difficult to wet, such as cereals. The addition of a wetter [*R.A.M.*, 33, p. 164] to spray mixtures proved uniformly advantageous, lowering surface tension and thereby producing a corresponding increase of wettability.

Fischer (W.). **Zur Herstellung von Papierabdrücken kupferhaltiger Spritzbeläge.** [On the preparation of paper prints of copper-containing spray residues.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 5, 10, pp. 157–158, 2 figs., 1953.

A further method for the impression on paper of the residues left on foliage by copper-containing fungicides [*R.A.M.*, 31, p. 501; cf. 33, p. 376] is described, based on the formation of deep brown copper diethyldithiocarbamate. The copper may be brought into solution with 5 to 10 per cent. acetic acid, but far better results were obtained with a reagent consisting of 5 per cent. sodium diethyldithiocarbamate solution in 25 per cent. dilute ammonia. By this procedure even microscopically invisible spots become discernible, and the clarity of the prints is not impaired by 50-fold magnification.

Unruh (M.). **Warndienst im Pflanzenschutz.** [The warning service in plant protection.]—*Z. PflKrankh.*, 60, 9–10, pp. 449–463, 1953. [English summary.]

This is a general survey and discussion of the progress to date in the organization of warning services for the prediction of plant disease and pest outbreaks. Information regarding the most favourable periods for treatment is quite as important to the farmer as the availability of high-grade plant-protectives and knowledge of the correct methods of application. Among the most urgent of the problems still awaiting solution is a clarification of the overwintering biology of *Phytophthora infestans* [*R.A.M.*, 29, p. 49 and below, p. 500], the only reliable basis for the forecasting of potato blight epiphytotics.

Chaze (J.), Thieblot (L.), & Lagarde (J.). **Sur la toxicité de cultures d'Alternaria tenuis Auct. isolés à partir de grains de Lolium temulentum L.** [On the toxicity of cultures of *Alternaria tenuis* Auct. isolated from seeds of *Lolium temulentum* L.]—*C. R. Acad. Sci., Paris*, 237, 23, pp. 1572–1574, 1953.

Alternaria tenuis, isolated from fragments of *Lolium temulentum* seeds in samples of French flour and cultured on flour decoctions (25 to 600 per mille) and 'complete' bread wheat grain, was responsible for 86 and 100 per cent. mortality, respectively, in mice fed on filtrates, washed mycelium, or a mixture of mycelium and substrate.

Helwig (H.). **Bücher mit Schimmelpilzbefall. Desinfektions- und Konservierungsmöglichkeiten.** [Books with mould contamination. Disinfection and preservation possibilities.]—*Papier*, 7, 13–14, pp. 235–239, 1953. [English and French summaries.]

The various methods which have been described in the literature for the disinfection and preservation of books against mould damage [*R.A.M.*, 32, p. 583] are reviewed and dismissed as impracticable for use in German public libraries on account of their unreliability on the one hand and the exorbitant costs and labour requirements on the other. The development of an effective and economical decontamination procedure is regarded as urgently necessary.

Calle (H.). **Estado actual de los trabajos sobre propagación de microorganismos alimenticios en pulpa y mucílago del Café.** [The current situation regarding

studies on the propagation of industrial micro-organisms in Coffee pulp and mucilage.]—*Bol. inf. Colombia*, 5, 50, pp. 22–29, 1 diag., 1954. [Mimeographed.]

The author describes a method of employing coffee pulp and mucilage for the multiplication on a commercial scale of yeasts and industrial micro-organisms, including *Aspergillus oryzae*, which will grow well in this medium without added nutrients.

Hendrickx (H.) & De Vleeschauwer (A.). **Prevention of mold development on cheese rind.**—*Meded. LandbHoogesch. Gent*, 17, pp. 669–677, 1952. [Flemish. Abs. in *Chem. Abstr.*, 47, 15, p. 7690, 1953.]

Sodium nipagin [sodium *p*-hydroxybenzoate], nipacombin A, vitamin K_5, and sodium propionate [*R.A.M.*, 25, p. 174 *et passim*] inhibited the development of [unspecified] cheese moulds [30, p. 183] on wort agar plates, but only the first two were effective in practical experiments. After salting, cheeses of the Gouda type were treated with aqueous solutions of sodium nipagin at 15 per cent. and nipacombin at 10, 15, and 20 per cent. and stored at a temperature of 10° C. and a relative humidity of 90 to 92 per cent. Mould growth began to appear after a fortnight and six weeks, respectively, on the untreated and some treated samples. After six weeks treated cheeses at 10° and a relative humidity of 84 to 86 per cent. were still mould-free.

Bergemann (J.). **Grundlagen und Probleme der Mykorrhizaforschung in ihrer Bedeutung für die Forstwirtschaft.** [Formulations and problems of mycorrhiza research as they affect silviculture.]—*Mitt. BdAnst. Forst- u. Holzw.* 33, 77 pp., 8 figs., 1953. [Mimeographed.]

Stating that no original research on the mycorrhiza of forest trees has been carried out in Germany [cf. *R.A.M.*, 33, p. 372] during the last 15 years, in contrast to the progress in the study of the subject made in other countries, the author summarizes and discusses some outstanding contributions to the literature (listed in a 25-page bibliography), with special reference to the morphology, anatomy, taxonomy, physiology, and ecology of the ectotrophic type. In conclusion some concrete approaches to the solution of the mycorrhizal problem are considered in relation to various silvicultural practices involving a disturbance of the natural equilibrium, e.g., cultivation in nurseries and plantations; reclamation of waste ground, arable land, and border regions of the steppes; afforestation of moorland; and manuring and soil tillage in places where the cycle of nutritional substances is not complete.

Levisohn (Ida). **Aberrant root infections of Pine and Spruce seedlings.**—*New Phytol.*, 53, 2, pp. 284–290, 1 pl., 1954.

Heavy root invasions by mycelia of a species closely related to *Rhizoctonia silvestris* are frequently encountered in pine and spruce seedlings from established forest nurseries in Great Britain [*R.A.M.*, 21, p. 299]. In pine these associations are well-defined infections of the haustorial type whereas in spruce they are characterized by the presence of a very coarse intercellular net and the absence of a mantle. In the nursery and in pot-culture experiments at Bedford College, London, the aberrant association produced an adverse effect on the growth and health of Scots pine (*Pinus sylvestris*) and Corsican pine (*P. nigra*), while it may be regarded as fairly harmless in *P. contorta* and *P. radiata*; in Sitka spruce (*Picea sitchensis*) the symptoms of diminished vigour and growth are not very pronounced.

The predisposing cause of root invasions by the *Rhizoctonia*-like mycelia, appears to be the absence of a mycorrhizal equipment, and is indicative of soil conditions

inimical to the growth and functioning of a true mycorrhiza-former, which normally exercises biological control [cf. 32, p. 109].

ROBERTSON (N. F.). **Studies on the mycorrhiza of Pinus sylvestris I. The pattern of development of mycorrhizal roots and its significance for experimental studies.**—*New Phytol.*, 53, 2, pp. 253–283, 1 pl., 6 figs., 1954.

Studies at the Botany School, University of Cambridge, of the roots of adult and seedling Scots pine (*Pinus sylvestris*) in the field and in pots demonstrated that red-brown, forked mycorrhiza [cf. *R.A.M.*, 32, pp. 109, 268; 33, p. 371] without macroscopically obvious external hyphae develop from short roots in acropetal succession along the length of the long root in association with the development of a Hartig net. When the long root begins to elongate in the spring the net extends into new part either directly or by means of an external weft of mycelium. The short roots become infected by way of the mycelium in the cortex of the long root after they have broken out of the cortex.

It is suggested that pseudomycorrhiza [32, p. 109] are formed most frequently from the short roots near the tip and near the base of the long root. *Mycelium radicis atrovirens* [33, p. 372] was isolated from the exterior of healthy, elongating long roots, where it appeared to be the dominant fungus. In pot experiments living seedlings with mycorrhizal infection were a good source of mycorrhizal inoculum whereas detached roots of similar plants were not. Inoculum was shown to be air-borne; sometimes, e.g., with *Boletus granulatus*, it probably consists of basidiospores.

HARLEY (J. L.) & BRIERLEY (J. K.). **The uptake of phosphate by excised mycorrhizal roots of the Beech VI. Active transport of phosphorus from the fungal sheath into the host tissue.**—*New Phytol.*, 53, 2, pp. 240–252, 7 graphs, 1954.

Further experiments in this series at the Department of Botany, University of Oxford [*R.A.M.*, 33, p. 247], were directed towards determining the route by which phosphate passes through the fungal sheath into the root core of excised beech mycorrhiza. A redistribution of P^{32} in the tissues was demonstrated at the end of the absorption period. The dependence of this movement on temperature and oxygen supply indicates that it is a metabolic change; active transport of phosphorus from fungus to host occurs, the mechanism depending on aerobic metabolic processes in the fungus as well as on the absorptive processes of the core. The loss of phosphate from the sheaths of roots kept in low oxygen concentrations results from temperature-sensitive anaerobic processes occurring in that tissue.

MARKERT (C. L.). **Lethal and mutagenic effects of ultraviolet radiation on Glomerella conidia.**—*Exp. Cell Res.*, 5, 12, pp. 427–435, 1 fig., 1 graph, 1953.

In experiments at the Department of Zoology, University of Michigan, the survival curves of conidia of *Glomerella cingulata* subjected to ultra-violet irradiation for periods ranging from 30 to 1,500 seconds at 4,770 ergs per sq. cm. per second were sigmoid, corresponding approximately to a 7-hit curve or indicating radiation-induced toxic substances with a threshold for lethal action. At high doses of radiation the survival curve levels off to a long plateau, denoting the presence of a small proportion of resistant spores. Under the microscope these conidia are characterized by the presence of a melanin pigment in contrast to the hyaline majority. With increasing period of radiation the mutation curve ascends to a peak and then declines on account of the rising proportion of resistant pigmented conidia among the surviving population. The mutation curve for sensitive spores alone does not decline at the higher doses of radiation.

Bloch (R.). **Defense reactions of plants to the presence of toxins.**—*Phytopathology*, 43, 7, pp. 351–354, 1953.

Most of the 25 references forming the basis of the author's paper, presented at the Symposium on Physiology of Parasitism at the 44th Annual Meeting of the American Phytopathological Society at Ithaca, New York, on 9th September, 1952, have been noticed from time to time in this *Review*. Following an introduction to the problems involved in the toxin theory of disease in plant pathology, the subject is discussed under the headings of nature of defence reactions, defence reactions and wound reaction, chemical aspects of defence, and defence reaction and pathogen.

Yarwood (C. E.). **Heat of respiration of injured and diseased leaves.**—*Phytopathology*, 43, 12, pp. 675–681, 1 diag., 4 graphs, 1953.

At the Department of Plant Pathology, University of California, Berkeley, the temperatures of 10 gm. green weight of detached healthy leaves in vacuum cups, measured by a mercury thermometer reading to 0·01° C., reached 0·5° to 2·5° above air temperature in four to 20 hours, the increases being particularly marked with material collected late in the day and given an extra supply of sugar. Rubbing with carborundum and spraying with lime-sulphur or Bordeaux mixture also contributed to a rise in temperature. The inoculation of tobacco and *Nicotiana glutinosa* with tobacco mosaic virus, of bean (*Phaseolus vulgaris*) with tobacco necrosis, southern bean mosaic, and white clover mosaic viruses, and *N. glutinosa* with cabbage black ring virus, raised leaf temperatures by an average of 21 per cent., while a further upward trend was observed in potato leaves inoculated with *Phytophthora infestans*, lettuce with *Bremia lactucae*, onion with *Peronospora destructor*, bean with *Erysiphe polygoni*, *Colletotrichum lindemuthianum*, and *Uromyces phaseoli* [*U. appendiculatus*], oak (*Quercus agrifolia*) with *Sphaerotheca lanestris*, and apple with *Podosphaera leucotricha*, the average increase being 82 per cent. The anomalous outcome of the test with peach leaf curl (*Taphrina deformans*), in which the temperature of the inoculated leaves was lower than that of healthy ones, is attributed to the low dry matter content of the former.

The temperatures of bean leaves attacked by *U. appendiculatus* [*R.A.M.*, 28, p. 106] definitely exceeded those of healthy ones on the fifth day after inoculation and remained at 44 to 228 per cent. above them until the 17th day, two days before the plants died. Since the killing of the mycelium in living leaves did not cause a clear fall in temperature, it is assumed that the rise is due to the respiration of the host rather than to that of the pathogen [cf. 33, p. 106].

Rehm (H.-J.). **Untersuchungen über das Verhalten von Pilzen und Streptomyzeten in Mischkultur.** [Studies on the behaviour of fungi and streptomycetes in mixed culture.]—*Zbl. Bakt.*, Abt. 2, 107, 17–20, pp. 418–431, 7 figs., 1954.

In mixed cultures of actinomycetes and fungi at the Botanical Institute, University of Greifswald, Germany, *Aspergillus niger* proved to be very insensitive to the influence of the antagonists, while *Trichothecium roseum* suffered no special disadvantage from their presence. At the beginning rapidly growing species like '*Citromyces pfefferianus*', *Stemphylium alternariae*, *S. piriforme*, *Alternaria nucis*, *A. tenuis*, and a *Fusarium* of the *discolor* group suppressed the actinomycetes, but subsequently the latter overgrew and utilized the three first-named species. After an initial period of equilibrium the slower growing *Cladosporium fulvum* and *Hormodendrum cladosporium* [*C. cladosporioides*] were overrun by the actinomycetes. The antagonistic action of the antibiotic actinomycetes is directed in some species primarily against spore germination, while in others mycelial growth is also drastically impeded.

Schneider (Roswitha). **Untersuchungen über Feuchtigkeitsansprüche parasitischer Pilze.** [Studies on the humidity requirements of parasitic fungi.]—*Phytopath. Z.*, **21**, 1, pp. 63–78, 2 figs., 8 graphs, 1953.

The relative vapour pressure [humidity] threshold values (expressed as percentages) for spore germination in pure cultures (mostly on malt extract gelatin) of pathogenic fungi [cf. *R.A.M.*, **22**, p. 150] at the Biological Institute, Berlin-Dahlem, were as follows: *Thielavia* [*Thielaviopsis*] *basicola* from cyclamen [16, p. 465] 94, *Verticillium albo-atrum* from poppy 93, *Beauveria bassiana* from the beetle *Liophloeus tessulatus* and *Septoria apii* from celery 92, *Gloeosporium fructigenum* [*Glomerella cingulata*] and *Phomopsis* sp. from walnut, *Fusarium avenaceum* from potato, *F. culmorum* from wheat, and *F. lini* from flax 91, *F. decemcellulare* from *Hibiscus sabdariffa*, *F. solani* from pea, and *Helminthosporium papaveris* [*Pleospora calvescens*] from poppy [29, p. 433] 90, *F. lateritium* from walnut, *F. bulbigenum* var. *lycopersici* from tomato, *F. caeruleum* from potato, and *F. oxysporum* from cyclamen 90, and *F. sporotrichioides* from vegetable marrow 89.

For mycelial growth the optimum level for all the foregoing species, as well as for *Rhizoctonia* [*Corticium*] *solani* from potato and *Ophiobolus graminis* from wheat, was 100 per cent., growth being distinctly retarded at 99·5 per cent. except in *P. calvescens*, *Phomopsis* sp., *F. avenaceum*, *F. sporotrichioides*, and *F. solani*, for which the limiting values lay at 99 or 98 per cent. Of all the species investigated, *C. solani* and *O. graminis* suffered most from a reduction in humidity, the minimum values permitting mycelial growth being 96·5 and 94 per cent., respectively.

In similar experiments with cereal rusts [cf. 4, p. 154; 13, p. 83] the uredospores of *P. dispersa*, *P. triticina*, and *P. coronifera* [*P. coronata*] germinated at relative humidities of 98·5, 98, and 97·5 per cent., respectively. No germination of *P. glumarum* occurred except in fresh tap water-gelatin smears.

Brown (J. C.). **The effect of the dominance of a metabolic system requiring iron or copper on the development of lime-induced chlorosis.**—*Plant Physiol.*, **28**, 3, pp. 495–502, 3 figs., 1953. [Received June, 1954.]

In nutritional experiments at the Bureau of Plant Industry, Beltsville, Maryland, a determination was made of the enzyme activities [see below, p. 506] of various plants grown on calcareous and copper-deficient organic soils and mixtures of these. The catalase activity of plants with lime-induced chlorosis was lower than in normal ones, but there was no change in peroxidase or ascorbic acid oxidase activity. A low level of the latter was a good index of deficiency in the supply of available copper, whether or not there were copper deficiency symptoms. Ottawa Select spring rye grew well on all the soils, and Red Kidney beans [*Phaseolus multiflorus*] and tobacco on the copper-deficient. Thatcher spring wheat, Hannchen barley, Long Green okra [*Hibiscus esculentus*], Midland milo [sorghum], and cocklebur [*Xanthium* sp.] responded to copper.

Gaugh (H. G.) & Dugger (W. M.). **The role of boron in the translocation of sucrose.**—*Plant Physiol.*, **28**, 3, pp. 457–466, 2 graphs, 1953. [Received June, 1954.]

Experimental evidence secured at the University of Maryland, that sugar moves more readily through cellular membranes (pea and Lima bean [*Phaseolus lunatus*] excised root tips and tomato leaves) in the presence of boron, suggests that an essential role of boron in plants is to form an ionizable sugar-borate complex which passes more easily through the membranes than sugar alone. The authors postulate that boron deficiency symptoms are, in fact, an expression of sugar deficiency.

Völk (J.) & Bode (O.). **Weitere Untersuchungen zur Frage eines Zusammenhanges zwischen Düngung, Blattlausbesatz und Krankheitsausbreitung in Kartoffelbeständen. II. Mitteilung.** [Further studies on the question of a

correlation between manuring, aphid colonization, and disease dissemination in Potato stands. Note II.]—*Z. PflKrankh.*, 61, 2, pp. 49–70, 10 graphs, 1954. [English summary.]

Further studies at the Institute for Virus Research, Celle, Germany, were concerned with the question whether the increased incidence of potato leaf roll virus [*R.A.M.*, 33, p. 13] in plants receiving potassium chloride soil amendments [31, p. 571] is attributable to augmented colonization by the aphid vector *Myzus persicae* or to enhanced susceptibility of the host.

Weekly counts revealed no increase in the numbers of aphids on the treated plots, but taking the average of infected plants in all the plots as 100, the degree of leaf roll infection was 69·5 in the untreated and 132 and 138 in those amended with sodium and potassium chlorides, respectively. The substitution of sulphate for chloride resulted in a reduction of leaf roll despite heavy aphid infestation, and it is concluded, therefore, that the chlorine component of the fertilizer is the decisive factor in the promotion of susceptibility to the disease.

The results of similar tests with potato virus Y were ambiguous.

Ross (H.). **Über die Resistenz der Kartoffelsorten gegen das A-Virus auf der Basis der Überempfindlichkeit. 1. Mitteilung.** [On the resistance of Potato varieties to the A-virus on the basis of hypersensitivity. Note 1.]—*Z. Pflanzenz.*, 32, 2, pp. 153–166, 1 fig., 1953.

During the period from 1949 to 1953 at the Max Planck Institute for Breeding Research, Voldagsen, Germany, experiments were carried out to determine the reactions of potato varieties to potato virus A [*R.A.M.*, 32, p. 273]. Transmission was effected by means of aphids, contact infection, and shoot and tuber grafting, while inoculum was provided by Allerfrüheste Gelbe and Juli or Samsun, also by White Burley tobacco plants inoculated by rubbing with sap from these varieties.

Of the 75 German varieties tested, Ackersegen, Augusta, Biene, Bona, Erstling [Duke of York], Fortuna, Frühnudel, Frühperle, Hindenburg, Marktredwitzer Frühe, Mittelfrühe, Primula, Roswitha, Sommerkrone, Stella, and Wiga proved to be hypersensitive and therefore field-immune. Three of the four foreign varieties, Abundance, Cardinal, and Kerr's Pink reacted in the same way. Fortuna is also hypersensitive to all strains of virus X [33, p. 249].

Bercks (R.). **Fortgeführte Untersuchungen über das Infektionsvermögen verschiedener X-Virusherkünfte gegenüber Kartoffeln.** [Further studies on the pathogenicity of different X-virus sources to Potatoes.]—*Züchter*, 23, 10–11, pp. 289–293, 1953.

The pathogenicity of 15 strains of potato virus X isolated from infected plants was tested by sap inoculation on 15 potato varieties in the field at the Brunswick branch of the German Biological Institute [*R.A.M.*, 33, p. 108 and preceding abstract], using the serological leaflet method of diagnosis. The isolates from the carrier varieties Direktor Johanssen, Erstling [Duke of York], and Kaiserkrone were virtually uniform in their effects: they attacked only the Flava, Heida, and Oberarnbacher Frühe varieties to an appreciable extent. The resistance of the other varieties, however, was not always absolute but admitted of occasional partial exceptions. Most of the other isolates were pathogenic to all the varieties, though differences in the degree of infection and the length of the incubation period indicated that the individual strains or mixtures thereof were not identical.

Menzies (J. D.) & Giddings (N. J.). **Identity of Potato curly top and green dwarf.** —*Phytopathology*, 43, 12, pp. 684–686, 1 fig., 1953.

The potato disease originally reported from Oregon under the name of 'green dwarf' [*R.A.M.*, 26, p. 75] and since observed in the Yakima Valley, Washington,

and southern California, was shown by graft transmission experiments to be caused by a strain (designated 12) of beet curly top virus. The insertion into the stems of Stokesdale tomato plants of wedge grafts consisting of terminal scions from infected potato, chilli, *Physalis angulata*, and *Datura stramonium* resulted in the development of typical curly top symptoms. The virus was transmitted from potato and tomato by *Circulifer tenellus* [*Eutettix tenella*], while the characteristic features of green dwarf appeared in Russet Burbank potatoes inoculated by means of the vector from sugar beet. The name of 'potato curly top' is now proposed as a substitute for 'green dwarf'.

Though generally unimportant, potato curly top may be of economic significance in fields set aside for certified seed stock.

Russell (T. A.). **Potato blight in West Africa.**—*Emp. J. exp. Agric.*, 22, 85, pp. 19–22, 1954.

The occurrence of potato blight (*Phytophthora infestans*) [C.M.I. map No. 109] in the British Cameroons was first noticed in May, 1952; in the second crop, in November, every plot examined was found to be infected. The outbreak in 1953 was less severe, but the fungus was also found on tomatoes. The disease appeared in the French Cameroons in 1951, possibly carried over from Europe in imported seed tubers. The usual method of control by spraying with 1 per cent. Bordeaux mixture every ten days was not effective in this region of heavy rainfall.

Varietal resistance tests were carried out at the Government Farm, Bambui, in March and April, 1953; blight-resistant varieties [*R.A.M.*, 33, p. 315] imported from Scotland, the United States, and Canada were planted amongst susceptible local varieties. Seedlings 1521*c*(3), 1521*d*(24), 1522*c*(11), 1564*a*(14), 1565(4), 1664*a*(12), 1668*b*(7), 1928*e*(2), and the varieties Cherokee, Kennebec, Pungo, B73–10, B73–18, B922–6, Placid, Canso, and Keswick were highly resistant; by mid-June all these were green and healthy while the local varieties were completely blighted.

Alvarez-García (L. A.), Adsuar (J.), Rodríguez (J. P.), Miret (A. C.), Arostegui (F.), Olivencia (R.), & Rochet (F.). **Fungicidal control of early and late blight of the Potato in Puerto Rico.**—*J. Agric. Univ. P. R.*, 37, 4, pp. 288–297, 1953. [Spanish summary.]

Plot experiments at Río Piedras, Cidra, and Corozal, Puerto Rico, from 1945 to 1951 demonstrated the effectiveness of Bordeaux mixture, copper A compound, dithane D-14, dithane Z-78, parzate, phygon XL, fermate, and zerlate in controlling early (*Alternaria solani*) [cf. *R.A.M.*, 24, p. 221] and late blight (*Phytophthora infestans*) [cf. 31, p. 373] on Red Bliss Triumph, Irish Cobbler, and Katahdin potatoes and increasing yield. Efficacy varied with the environmental conditions and the type of blight but in general zerlate, dithane Z-78, and parzate (in that order) were best against early blight [cf. 33, p. 413] while the copper compounds were more effective against late blight. Yields were increased in years when rainfall was neither too scanty nor too abundant. Potato culture would be more satisfactory if varieties with at least one-gene resistance to the common race of *P. infestans* were grown. Even better results are expected when new three-gene-resistant varieties well adapted to short-day growth periods are released.

Johannes (H.). **Versuche zur Herabsetzung der Spritzbrühmengen II. Phytophthora-Bekämpfung.** [Experiments on the reduction of spray liquid quantities II. *Phytophthora* control.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 7, pp. 106–108, 5 graphs, 1953.

An account is given of the methods and results of experiments carried out at seven research institutes in different parts of Germany to determine the practica-

bility of reducing the quantities of spray liquid applied for the control of potato blight (*Phytophthora infestans*) [*R.A.M.*, 33, p. 410 and following abstracts] without loss of efficiency. The fungicide used was cupravit (Ob 21), which contains 45 per cent. copper oxychloride; one treatment was given before and another immediately after the appearance of symptoms. From the sum-total of the results it is concluded that the quantity of fungicide applied should range from 4 to 6 kg. per ha. according to local conditions, with a liquid consumption per ha. of not less than 400 l.

Voelkel (H.). **Schadgebiete der Kraut- und Knollenfäule der Kartoffel.** [Regions of damage from Potato top and tuber blight.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 6, 3, pp. 36–38, 3 maps, 1954.

'Regions of damage' are defined as areas in which a plant disease or pest is endemic. In connexion with the preparation of an atlas of such areas in Germany a critical analysis was made of 94,262 notifications of potato blight (*Phytophthora infestans*) [see preceding and next abstracts] submitted to the Biological Institute between 1925 and 1944. The years providing the largest numbers of records were 1926 (547), 1931 (8,942), 1932 (8,481), 1936 (8,796), 1937 (8,324), 1938 (8,019), and 1940 (9,092), of which 233 (42·6 per cent.), 2,075 (23·2), 967 (11·7), 2,120 (24·1), 649 (7·8), 778 (9·8), and 982 (10·8), respectively, were severe. In the remaining years the proportion of heavy attacks ranged from 4 to 16·3 per cent., with an average of 12·8 for the period. In 11 of the 20 years for which data are available the disease was most prevalent in the Münster district of Westphalia, while extensive attacks were reported in nine years from parts of Mecklenburg, Rhineland, Hessen, and the vicinity of Altena (Westphalia). If the districts (over 25) supplying the largest number of epiphytotic reports are combined with those in which blight assumed a virulent form in five or more years, a conspectus of the individual 'regions of damage' in different provinces [which are listed] is secured. They fall only in part within the principal zone of potato production.

No definite correlation could be established between environmental factors and blight development on the basis of these studies [loc. cit.].

Johannes (H.). **Beitrag zur Epidemiologie der Phytophthora infestans. I. Einführung und mikroklimatische Untersuchungen.** [Contribution to the epidemiology of *Phytophthora infestans*. I. Introduction and microclimatic studies.]—*Z. PflKrankh.*, 60, 6, pp. 289–307, 2 figs., 6 graphs, 1953. [English summary.]

Existing statistical methods for forecasting outbreaks of potato blight (*Phytophthora infestans*) [*R.A.M.*, 32, p. 29; 33, p. 244 *et passim*] being regarded as inadequate, the author has undertaken a fundamental study of the problem at the Brunswick branch of the German Biological Institute [see preceding abstracts], based on the assumption that microclimatic conditions are primarily responsible for the development and epiphytotic occurrence of the pathogen [cf. 17, p. 57; 29, p. 50; 33, p. 375]. It is generally recognized that a temperature of 13° to 18° C. and a relative humidity exceeding 95 per cent. are of paramount importance in the mass reproduction of the fungus.

In 1951 the Bona variety was used for the observations, supplemented in 1952 by Vera, Erstling [Duke of York], Flava, and Toni. Especially in the case of Bona, two periods of high relative humidity (not falling below 82 per cent. for more than $4\frac{1}{2}$ hours) had to prevail in the stands for at least 33 hours to ensure the development of an outbreak; a fall to 72 per cent., for instance, for as short a period as $2\frac{1}{2}$ hours during this critical spell interrupts the process of mass fructification. In 1952 these observations were confirmed in respect of Vera. Wind was found to exert no measurable influence on the microclimate unless its velocity exceeded 4 m. per second.

Oort (A. J. P.). **Het erste optreden van Phytophthora in het voorjaar.** [The first appearance of *Phytophthora* in the spring.]—*LandbVoorl.*, 11, 3, pp. 116–120, 2 figs., 1 diag., 1954.

Following a brief discussion of some potential modes of overwintering and spring infection by *Phytophthora infestans* [cf. *R.A.M.*, 33, pp. 174, 409] the author describes the observations of E. van der Zaag in 1952 and 1953 on the first appearance of the pathogen in the early potato-producing region of North Holland. The first symptoms were detected on 13th May in 1952 and on 28th April in 1953, in both cases on plants arising from diseased tubers on rubbish-heaps. Despite this, rubbish-heaps appear to be of little importance in the spread of blight under local conditions. In the field the first foci, generally involving 10 to 20 plants, were noted on 17th and 26th May, respectively. In every instance Eersteling [Duke of York] was the variety attacked and infection was virtually confined to the stems, which bore brown to brownish black stripes. Close examination of the plants in an infected group nearly always revealed one with thin, short, brown, shrivelled stems, which were found on lifting to originate from a diseased mother tuber. The stem symptoms are regarded as secondary, primary infection being in the tuber, which was probably so lightly attacked as to escape detection at planting time. Since the dark stripes did not reach the stem bases it is considered that they did not originate directly from the tuber [cf. loc. cit.].

Hofferbert (W.), Orth (H.), & Zu Putlitz (G.). **Unsere Arbeiten zur Rhizoctonia-Frage der Kartoffel. II. Teil.** [Our studies on the *Rhizoctonia* problem in the Potato. Part II.]—*Z. PflKrankh.*, 60, 8, pp. 385–397, 11 figs., 2 graphs, 1953. [English summary.]

A tabulated survey is given of further studies at Ebstorf, Germany, on the problem of breeding potatoes for resistance to *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 31, p. 454], which involved inoculation tests on a number of [unnamed] varieties and selections by three methods, namely, inoculation of (*a*) tubers or (*b*) seedlings and the application of sclerotia to ungerminated 'eyes'. Besides environmental factors and the stage of development of the plant, the following factors were found to be concerned in resistance to *C. solani*: a high degree of germinative vigour and rapid growth, especially in the early stages of development; a sufficiency of vigorous sprouts; capability of extensive root and stolon production and resistance to infection of these organs; good powers of regeneration; and resistance of the etiolated and green shoots to attack. From such features an estimate of the reaction of a variety to the pathogen may be obtained.

Tanaka (S.) & Katsuki (H.). **Growth factors of Rice-blast fungus. III. Biotin, thiamine, and other growth-accelerating factors.**—*J. chem. Soc. Japan, Pure Chem. Sect.*, 74, pp. 85–88, 1953. [Abs. in *Chem. Abstr.*, 47, 20, p. 10632, 1953.]

In further studies on rice blast [*Piricularia oryzae*] at Kyoto University, Japan [*R.A.M.*, 33, p. 177], biotin was found to be indispensable to growth on synthetic media, while thiamine exerted a stimulatory action. On this basis a formula is proposed for a medium including the two vitamins at concentrations of 300γ and 0·005 gm. per l., respectively.

Hewitt (E. J.). **The importance of trace elements in crop nutrition.**—*Brit. agric. Bull.*, 6, 28, pp. 222–229, 15 figs., 1953. [Received May, 1954.]

The author classifies trace elements [*R.A.M.*, 33, pp. 193, 252, and next abstract] and discusses their importance to crops from the aspects of identification of deficiency disorders, availability, role in plant nutrition, effect on particular crops

of deficiencies and excesses of each element, and the means of controlling these conditions.

Chkolnik (J.). **Importance et rôle des micro-éléments dans la vie de plantes et en agriculture.** [The importance and role of micro-elements in plant life and in agriculture.]—512 pp., 104 pl., 108 figs., Moscow and Leningrad, Imprimerie de l'Académie des Sciences, 1950. [Russian. Abs. in *Oléagineux*, 9, 5, pp. 364–365, 1954.]

The author summarizes the knowledge acquired throughout the world during the past 30 to 40 years on the importance of trace elements in plant and animal nutrition, indicating the means of diagnosing and correcting their deficiencies in plants [see preceding abstract]. The first part is devoted to a general bibliographical review (up to the end of 1948) on manganese, zinc, copper, and molybdenum nutrition with brief reference to less important elements. Part 2 deals entirely with boron and constitutes a monograph of its kind [*R.A.M.*, 28, p. 195]. The work concludes with a 32-page bibliography in various languages.

Krasil'nikov (N. A.). Микроорганизмы и плодородие почв. [Micro-organisms and soil fertility.]—Изв. Акад. Наук СССР [*U.S.S.R. Acad. Sci. News = Bull. Acad. Sci. U.S.S.R.*], *1954*, 2, pp. 14–39, 7 figs., 1 graph, 1954.

In this paper on the relation between micro-organisms and soil fertility the author deals in general with the importance of the former in plant nutrition, their activating and inhibiting effects, the protective role of microbe-antagonists, and the importance of plants in the microbiological processes in soils, quoting results from previous findings. It is concluded that more antibiotics are produced by micro-organisms in sterile than in non-sterile soil.

Miller (J. J.) & Webb (N. S.). **Isolation of yeasts from soil with the aid of acid, rose bengal, and oxgall.**—*Soil Sci.*, 77, 3, pp. 197–204, 1954.

The results of a study at the McMaster University, Hamilton, Canada, of the prevalence of yeasts in 10 soils by the dilution plate method indicated an average of 1,000 per gm. and a maximum round about 50,000. They were present in all but one of the samples. The detection and isolation of the yeasts was facilitated by the incorporation in the plating medium of three anti-bacterial agents, lactic acid, rose bengal, and oxgall [*R.A.M.*, 33, p. 380]. The last two also restrict the growth of spreading fungi, and their efficiency appears to be conditioned by the nature of the medium. In these experiments both were effective with all the soil samples on potato dextrose agar.

Stenton (H.). **The soil fungi of Wicken Fen.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 304–314, 3 graphs, 1953.

In studies on the microfungi of the alkaline, peaty soil of Wicken Fen, Cambridgeshire (*Trans. Brit. mycol. Soc.*, 19, pp. 280–287, 1934), approximately 120 species were isolated by the soil plate method [*R.A.M.*, 29, p. 530] over a period of two years. Among those most commonly obtained [cf. 33, p. 446] were *Mortierella minutissima*, *Pythium* spp., *Cylindrocarpon radicicola*, *Penicillium expansum*, *P. thomii*, *P. variabile*, *Volutella ciliata*, *Trichoderma viride*, *Stysanus stemonites*, *Cephalosporium acremonium*, *C.* sp. W 83, *Fusarium culmorum*, *Paecilomyces* sp., and *Cladosporium herbarum*.

The number of isolates diminished as the soil depth increased [31, p. 142]; two groups of fungi were distinguished by the position in the profile of their respective zones of greatest development. Few species were restricted in their horizontal distribution, but quantitative differences were detected between the floras of the

two sampling sites (A in a drove, F in a patch of old fen carr two-thirds of a mile away). Several basidiomycetes, including *Corticium coronilla*, were isolated regularly.

Saksena (S. B.). **A new species of Paecilomyces from soil.**—*J. Indian bot. Soc.*, 32, 4, pp. 186–189, 1 pl., 4 figs., 1954.

Paecilomyces fusisporus n. sp., characterized by brownish, pointed, fusiform conidia measuring 6 to 10 by 3 to 5 μ with thick walls bearing striking spiral markings from end to end, was isolated from a soil sample collected from Patharia Forest near Sagar, Madhya Pradesh, in August, 1952.

Spilsbury (J. F.). **Some fungus diseases of Digitalis lanata.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 335–346, 3 pl., 5 figs., 1953.

In 1952 *Digitalis lanata* plants growing in Kent were affected by three diseases. An anthracnose attributed to *Colletotrichum fuscum* [*R.A.M.*, 31, p. 256], occurring only on young plants at Dartford, was characterized by purplish brown lesions on the basal leaves and later by decay of the petioles and infection of the young leaves. As the spots aged they became lighter at the centre and coalesced until the whole leaf became necrotic and died back from the tip. In severe cases the entire aerial part of the plant was killed. The fungus is capable of causing great damage and may enter the seed. Control should be directed at producing seed in disease-free areas and examining it before sowing. All infected plants should be removed at once. Other *Digitalis* spp. should not be grown near *D. lanata*.

Leaf spot caused by *Septoria digitalis* [22, p. 154] was first observed on potted plants at Dartford and later on field plots in the same district. One diseased plant was found at Beckenham. The spots are irregularly shaped and fuscous with a purple border; minute pycnidia are scattered over the centres, which are generally pale. Leaves of all ages are affected. Information from Holland, where the disease was recorded in 1951 and 1952, suggests that frequently repeated copper sprays check the spread of the disease.

Leaf spot caused by *Phyllosticta digitalis* [24, p. 5] affected *D. lanata* and, more often, *D. purpurea* at Dartford. The spores, generally biguttulate, averaged 7 by 2·5 μ. On *D. purpurea* the pycnidia developed anywhere in the vein islets; on *D. lanata* they were restricted to the areas adjoining the veins in the centre of the leaf and commonly occurred near the leaf bases, producing a brownish necrosis. Since spore dissemination in this fungus may possibly be zoochorous, the accumulation of garden pests beneath the plants should be prevented.

Vizioli (J.). **Factores ecológicos e patogenicidade da carvão da Cana de Açúcar.** [Ecological factors and pathogenicity of Sugar-Cane smut.]—*Brasil açucar.*, 42, 5, pp. 535–540, 1953.

This is a review of the literature on sugar-cane smut (*Ustilago scitaminea*), comprising an introduction and sections on the economic importance of the disease in early times; the possibility of the existence of physiologic races; the resistance of the 'noble' canes and the susceptibility of new varieties; and the influence of (*a*) climatic and (*b*) meteorological factors on the course of infection. The pathogen is believed to have been introduced into São Paulo, Brazil [*R.A.M.*, 33, p. 448], in 1944.

Mungomery (R. W.). **Precautions in hot water treatment of Sugar Cane seed pieces against ratoon stunting disease.**—*Cane Gr. quart. Bull.*, 17, 2, pp. 54–61, 1953. [Abs. in *Sugar, N.Y.*, 49, 4, pp. 54–55, 1954.]

Attention is drawn to some features of the application of the hot water treatment for the control of ratoon stunting in sugar-cane in Queensland [*R.A.M.*, 33, p. 320

and next abstract], which may lead to serious adverse results. For instance, wire baskets of $\frac{1}{2}$-in. mesh are preferable to bags as allowing better circulation of both water and air, so that after treatment the pieces cool down more rapidly and do not suffer the loss of germinability consequent on prolonged heating. The provision of optimum conditions in the field to encourage germination is of primary importance: the soil should be neither too moist nor too dry, and if planting must be done in cool weather priority should be given to varieties such as N.Co. 310, C.P.29/116, or Badila, which are reasonably reliable in their germination.

King (N. J.). **Progress in control of ratoon stunting disease.**—*Aust. Sug. J.*, 45, 7, pp. 484, 486, 1953.

During 1953 a number of Cane Pest and Disease Control Boards in Queensland embarked on a campaign for the control of ratoon stunting disease in sugar-cane by heat treatment [see preceding abstract]. A steam heating system was designed by the Bureau of Sugar Experiment Stations, operated with tanks capable of treating up to three tons of plants at a time and giving an output of 12 tons in an eight-hour shift. One Board planted a sufficient acreage of treated plants to ensure 10,000 tons of clean 'seed' for the next planting season, while over 40 acres were planted by one of the smallest mill areas in the State, providing some 1,200 tons of disease-free material for 1954.

Barnes (A. C.). **Agriculture of the Sugar Cane.**—x+392 pp., 54 figs., 9 diags., 1 graph, 1 map, London, Leonard Hill Limited, 1953. 42*s*.

This practical manual, based on wide experience in agricultural administration, sugar plantation management, and research in many parts of the British Commonwealth, contains two chapters with information on the pathology of the crop, viz., 6 (Pests and diseases, their effects and control, pp. 82–94), and 7 (Sugar-cane varieties and plant breeding, pp. 95–112), besides scattered references to the subject in other chapters, e.g., 2 (The principal cane-sugar producing countries, pp. 6–43), 4 (Sugar-cane soils, pp. 52–65), 10 (Fertilizers and manures, their application and effect, pp. 154–177), and 20 (Research and the planter, pp. 351–361).

Crossan (D. F.). **Comparative studies on species of Ascochyta from Okra, Bean, and Cotton in North Carolina.**—Abs. in *Phytopathology*, 43, 9, p. 469, 1953.

The results of cross-inoculation experiments with isolates of *Ascochyta abelmoschi* from *Hibiscus esculentus*, *A. gossypii* from cotton [*R.A.M.*, 33, p. 153], and *A. phaseolorum* from snap and Lima beans (*Phaseolus vulgaris* and *P. limensis* [*P. lunatus*: 31, p. 366]) showed that all were equally and highly pathogenic to the four hosts and produced pycnidia on them. The several isolates were indistinguishable on the basis of spore dimensions and shape and the three species of *Ascochyta* which they represent are believed to be identical. In further tests the strains from the above-mentioned plants were pathogenic to hollyhock, soy-bean, chilli, and eggplant, indicating that the morphologically similar species described on these hosts may also be related to or identical with the forms occurring on cotton, *H. esculentus*, bean, and *P. lunatus*.

Thirumalachar (M. J.) & Whitehead (M. D.). **On the validity of the genera Coleopuccinia and Coleopucciniella (Uredinales).**—*Amer. J. Bot.*, 41, 2, pp. 120–122, 5 figs., 1954.

The type material of *Coleopuccinia sinensis* on *Cotoneaster* sp. [*R.A.M.*, 28, p. 32] was compared with collections of *Coleopucciniella simplex* on loquat. Patouillard's description of the two-celled teleutospores of the former with the pedicels gelatinizing at maturity is confirmed. *Coleopuccinniella* is considered to be a valid

genus with entirely different characters and not merely a one-celled form of *Coleopuccinia* as described by Tai [loc. cit.]. The teleutospores are unicellular-catenulate with no evidence of gelatinization in any part of the sorus. *C. kunmingensis* [loc. cit.] with unicellular teleutospores and gelatinized pedicels is considered not to be a *Coleopucciniella* but to belong to an undescribed genus.

Dennis (R. W. G.) & Gray (Elizabeth G.). **A first list of the fungi of Zetland (Shetland).**—*Trans. bot. Soc. Edinb.*, 36, 3, pp. 214–223, 1 fig., 1954.

This preliminary list of fungi and bacteria from the Shetland Islands was compiled on the basis of nine years of plant pathological records and collections made in August and September, 1952. The oat species *Avena strigosa* grows well on manganese-deficient soils in this area. Potato crops are sometimes attacked by *Sclerotinia sclerotiorum* causing stalk break [cf. *R.A.M.*, 31, p. 6], and *Phytophthora infestans* [33, p. 374] is very destructive since the climate is favourable to blight. A local cabbage variety is resistant to *Plasmodiophora brassicae* [C.M.I. map No. 101] under Shetland conditions.

Among other interesting records may be mentioned *Phialea temulenta* on *Lolium perenne*, *Epichloe typhina* on *Agrostis stolonifera*, *Ophiobolus graminis* on oats [*R.A.M.*, 24, p. 178], *Phoma foveata* on potato [C.M.I. map No. 210], *Phyllosticta grossulariae* on gooseberry, *Septoria avenae* [*Leptosphaeria avenaria*] on oats, and *S. ribis* on black currant. *Botrytis cinerea*, causing chocolate spot of broad bean [*R.A.M.*, 29, p. 72], *Fusarium nivale* [*Calonectria nivalis*] on oats, *Helminthosporium vagans* on *Poa pratensis*, *Oospora pustulans* on potato [33, p. 376; C.M.I. map No. 202], and *Rhynchosporium secalis* on barley were recorded. Two plant diseases due to bacteria occur here: *Bacterium carotovorum* [*Erwinia carotovora*: cf. *R.A.M.*, 25, p. 415], causing black leg of potato, and halo blight of oats (*Pseudomonas coronafaciens*).

Canter (Hilda M.). **Annotated list of British aquatic chytrids.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 278–303, 1953.

This is an annotated list of the aquatic chytrids recorded in the British Isles [*R.A.M.*, 32, p. 647], arranged according to Sparrow's classification [22, p. 327], and giving, where possible, the location of the reference material, together with a list of substrata and a genera-species index.

Nicolas (G.) & Aggéry [Berthe]. **Notes phytopathologiques. Neuvième série.** [Phytopathological notes. Ninth series.]—*Bull. Soc. Hist. nat. Toulouse*, 87, 3–4, pp. 277–298, 1952.

Among the records in the current instalment of the authors' annotated list of fungi collected in the vicinity of Toulouse, France [cf. *R.A.M.*, 29, p. 383], may be mentioned *Entyloma fuscum* on *Papaver rhoeas* [27, p. 115], *Puccinia menthae* on *Mentha rotundifolia* [C.M.I. map No. 211], *Gymnosporangium amelanchieris* on *Amelanchier vulgaris* [*R.A.M.*, 15, p. 609], *Melampsora larici-caprearum* on *Salix caprea*, *Uromyces caryophyllinus* [*U. dianthi*] on *Dianthus monspessulanus*, and *U. fabae* on *Vicia cracca* [C.M.I. map No. 200].

Da Camara (E. de S.) & De Vasconcelos (A. T.). **Fungi Lusitaniae VI.** [Fungi of Portugal VI.]—*Agron. lusit.*, 15, 3, pp. 183–191, 1 pl., 1953.

This further instalment of the current list of Portuguese fungi [*R.A.M.*, 33, p. 183] comprises three new species and 29 other records, including three new to the country.

Homburg (K.). **De practische uitvoering der blister-blight bestrijding.** [The practical execution of blister blight control.]—*Bergcultures*, 22, 21, pp. 467–469,

471–473, 475, 477–479, 481, 5 figs., 3 graphs, 1953. [English and Indonesian summaries.]

The author makes a practical survey of the materials, machinery, and methods used to date in the very successful trials performed in the control of blister blight [*Exobasidium vexans*] of tea in Java by spraying with copper-containing fungicides [*R.A.M.*, 33, p. 323].

He concludes that cultural practices, such as shading, weeding, plucking, and pruning have an important effect on control by means of copper fungicides. The most economical and reliable control will be secured with locally manufactured copper-containing dusts (2 per cent. copper) at 10 kg. per ha. in a short round. Doubling the copper concentration does not result in proportionate increases in the copper cover of the leaves and two to three days later the copper deposit is at a low level. For sprays a water suspension (with 2·5 per cent. copper) at 10 l. per ha. is likely to be the most effective; the addition of a sticker enables longer rounds to be used. Tea should not be plucked within two days of treatment.

Person (L. H.) & Lucas (G. B.). **Oospore germination in Peronospora tabacina.**—*Phytopathology*, 43, 12, pp. 701–702, 1953.

At North Carolina State College, Raleigh, individual dead tobacco leaves collected from a plant bed in April, 1952, were found to contain over 1,000 oospores of *Peronospora tabacina* [*R.A.M.*, 33, p. 453], but no germination was obtained in tests with more than 100,000, using the method of Wolf *et al.* [16, p. 65] and other procedures. In the following October three experiments were carried out in which leaves bearing oospores were placed in the top layer of sterilized soil in pots, which were then sown with tobacco seed and covered with transparent plastic chimneys. About a month later blue mould developed on some of the seedlings in these pots but not in those to which no leaf material was added.

In further experiments in April, 1953, fragments of oospore-bearing leaves were placed on the soil surface of pots containing tobacco seedlings in the two-leaf stage, which were then transferred to a room maintained at a temperature of 65° F. and illuminated by daylight fluorescent light for 12 hours daily. After about three weeks some of the oospores produced one or occasionally up to three sessile sporangia, from which zoospores, roughly 5 μ in diameter, were produced within 20 minutes in water, more than 100 emerging singly from each sporangium. In five replications of this test no germ-tubes were formed but sporangia developed from more than 200 oospores. The inoculation of pots of tobacco seedlings with zoospore suspensions obtained from this source, the pots then being covered with polyethylene plastic bags, held at 65°, and subjected to alternating light and darkness every 12 hours, resulted in the development of blue mould conidia in eight to ten days, similar results being obtained in four replications. Strong evidence is thus afforded that the zoospores of *P. tabacina* infect tobacco as part of the blue mould disease cycle.

Stover (R. H.) & Waite (B. H.). **An improved method of isolating Fusarium spp. from plant tissue.**—*Phytopathology*, 43, 12, pp. 700–701, 1953.

At the Tropical Research Department, United Fruit Company, La Lima, Honduras, *Fusarium oxysporum* f. [var.] *nicotianae* [*R.A.M.*, 33, p. 380] developed poorly or not at all from surface-sterilized material of tobacco stalks or petioles plated directly on agar, but it grew well on a medium incorporating blended tissue [32, p. 634]. By blending and plating various portions of wilted plants two to three weeks after the first appearance of symptoms, the fungus was found to be largely concentrated in the larger roots and the lower stock up to the first leaf petiole.

Steinberg (R. A.). **Symptoms of molybdenum deficiency in Tobacco.**—*Plant Physiol.*, 28, 2, pp. 319–322, 1 fig., 1953. [Received May, 1954.]

In studies conducted at the Plant Industry Station, Beltsville, Maryland, molybdenum deficiency symptoms were induced in Connecticut Broadleaf tobacco [*R.A.M.*, 32, p. 600 and next abstract] in nutrient solutions purified by a modified calcium carbonate method or an 8-hydroxyquinoline (oxine) technique [cf. 27, p. 401]. After about 24 days the seedlings developed a savoying and mottling of the lamina of the middle leaves. Bending and twisting were followed by the appearance of small, interveinal, necrotic areas, often starting at the margin, which gradually enlarged until the whole leaf became withered, the dead areas turning almost white. Later, upper and lower leaves became affected. Flowering was delayed by one week and the total dry weight reduced by approximately 35 per cent.; the affected plants averaged 55 in. high, as compared with 70 in. for plants supplied with 10 l. of solution containing 0·05 p.p.m. molybdenum. The molybdenum content of the leaves of a control plant was about 6·4 p.p.m., as against slightly less than 0·3 p.p.m. for a deficient plant in the savoy stage. Deficiency symptoms were associated with high nitrate and low protein nitrogen in the leaves.

Brown (J. C.) & Steinberg (R. A.). **Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils.**—*Plant Physiol.*, 28, 3, pp. 488–494, 1953. [Received June, 1954.]

In water-culture studies at the Bureau of Plant Industry, Beltsville, Maryland, it was shown that in Connecticut Broadleaf tobacco each specific micronutrient deficiency produces a distinct enzyme pattern in the leaf as demonstrated by the comparative activities of ascorbic acid oxidase, catalase, and peroxidase. Some of these enzyme patterns appeared in the lamina before visual symptoms or even in their absence. Catalase activity was low in iron-, boron-, and zinc-deficient plants and high in copper-deficient. Peroxidase activity was lower in iron-deficient plants and higher in those lacking manganese. Manganese-, molybdenum-, and copper-deficient plants showed decreased ascorbic acid oxidase activity [see above, p. 496].

Desjardins (P. R.), Senseney (C. A.), & Hess (G. E.). **Further studies on the electron microscopy of purified Tobacco ringspot virus.**—*Phytopathology*, 43, 12, pp. 687–690, 1 fig., 2 graphs, 1953.

Experiments at Camp Detrick, Frederick, Maryland, were designed to obtain accurate measurements of the diameter of tobacco ring spot virus particles [*R.A.M.*, 21, p. 90; 30, p. 557] by means of differential centrifugation and electrophoretic fractionation. The average diameter of the five- or six-sided particles was shown by electron microscopic studies of the highly purified material to be 22 mμ. There was a significant correlation between local lesion assay on cowpea plants and particle counts of electron micrographs of the resuspended pellets and supernatant fluids. Thus, infectivity was apparently associated with the type of particle observed and counted.

Green (M.) & Stahmann (M. A.). **The inhibition of virus infectivity by synthetic polypeptides.**—Abs. in *Phytopathology*, 43, 9, p. 473, 1953.

Evidence was secured that synthetic lysine polypeptides reduce the number of local lesions produced by tobacco mosaic virus in a manner similar to the inhibitor plant proteins [cf. *R.A.M.*, 32, p. 298]. Polylysine was found to combine with viruses, bacteria, erythrocytes, and proteins, the resultant complex arising from interactions between the polyvalent positively charged polylysine and appropriate negatively charged receptor groups. It interferes with the virus-cell combination by competing for acidic centres. Polyglutamic acid caused similar inhibition.

Tomato diseases and their control.—*J. Dep. Agric. Vict.*, 52, 4, pp. 187–190, 5 figs., 1954.

Notes are given on the incidence, economic importance, and symptoms of four bacterial diseases of tomatoes in Victoria, namely canker (*Corynebacterium michiganense*) [*R.A.M.*, 22, p. 288; cf. 32, p. 595], which is the most serious; spot (*Xanthomonas vesicatoria*) [C.M.I. map No. 269], occasionally recorded in the wetter parts of the State; speck (*Pseudomonas punctulans*) [cf. *R.A.M.*, 28, p. 599], a mild disease which may occur alone or in combination with *X. vesicatoria*; and wilt (*P. solanacearum*) [25, p. 102; 29, p. 62], at present very rare and potentially dangerous only to glasshouse tomatoes in north-west Victoria.

Control recommendations include seed selection, soil sterilization, crop rotation, with the exclusion of tomatoes for at least three years or up to five in the case of wilt, when other susceptible hosts should also be avoided, weed control (wilt and bacterial spot), roguing and burning diseased plants, seed treatment with hot water followed by copper oxychloride or thiram dust, and watering by furrow rather than overhead irrigation.

Wishart (R. L.). **Early blight of Tomatoes.**—*J. Dep. Agric. S. Aust.*, 57, 7, pp. 289–294, 4 figs., 1954.

Following severe losses due to early blight (*Alternaria solani*) [*R.A.M.*, 29, p. 61] in autumn- and winter-grown outdoor tomatoes in South Australia, spray trials were carried out by the Department of Agriculture. In 1952 Bordeaux mixture (2:2:40), while giving effective control, was injurious to the plants, causing severe yield reductions. In 1953, when the disease developed late in the season, none of the materials used was phytotoxic, though all reduced yield; zineb (1½ lb. per 100 gals.) was outstanding in the prevention of foliage blight and with earlier appearance of the disease would probably increase yield. Control recommendations, most of which have already been noticed [cf. 27, p. 587], include regular zineb sprays at intervals of seven to ten days (five in rainy weather) throughout the season, starting with the first autumn rains.

Grogan (R. G.) & Kendrick (J. B.). **Seed transmission, mode of overwintering and spread of bacterial canker of Tomato caused by Corynebacterium michiganense.**—Abs. in *Phytopathology*, 43, 9, p. 473, 1953.

Previous reports indicate that tomato seed may transmit up to 100 per cent. infection by bacterial canker (*Corynebacterium michiganense*), but observations in California revealed a maximum of 1 per cent. [*R.A.M.*, 26, p. 136; 29, p. 271] even with freshly harvested seed taken from fruits with severe internal infection. About the same incidence developed in seedlings grown from seed dipped in a virulent bacterial suspension or sown with freshly ground diseased plant material. Young plants sprayed with a suspension of the organism and held in a moist chamber for six to ten days remained free from infection, which was, in fact, secured only by the introduction of the bacteria into the vascular elements through stem or root injuries. The pathogen does, however, survive from one season to the next in contaminated plant refuse incorporated into seed-bed soil, and the method of transplanting to the field often results in a stand with over 50 per cent. canker, whereas direct sowing has never produced more than a trace and effectively controls the disease under local conditions.

Dimond (A. E.) & Waggoner (P. E.). **The cause of epinastic symptoms in Fusarium wilt of Tomatoes.**—*Phytopathology*, 43, 12, pp. 663–669, 1953.

Epinasty is a typical early symptom of tomato wilt (*Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*) [*R.A.M.*, 20, p. 385], and the studies herein reported

from the Connecticut Agricultural Experiment Station [33, p. 453] are concerned with the possible implication of ethyl alcohol and ethylene in the etiology of the condition.

Ethylene production [29, p. 465] by the fungus in culture and by infected tomato plants was demonstrated by their capacity to induce a triple response in Alaska peas (shortening of the epicotyl, increase in epicotyl diameter, and diageotropic curvature of the plumule), epinasty in tomato, and by chemical tests of the medium, such as bromine addition, permanganate reduction, and reversible trapping by mercuric perchlorate. The production of the gas varied with the substratum, ceased when the mycelium was autoclaved, and was obtainable with fungus-free extracts on a suitable medium, e.g., 3 per cent. maltose in 0·8 per cent. nutrient broth agar. From the available evidence ethylene is considered to be responsible for the development of epinasty but not of defoliation, another conspicuous symptom of wilt.

Ethyl alcohol is also produced by both pathogen and infected host, but not in sufficient quantities to cause epinasty in healthy plants, though it induced the triple response in peas.

Wilhelm (S.) & Ferguson (J.). **Soil fumigation against Verticillium albo-atrum.** —*Phytopathology*, 43, 11, pp. 593–596, 1 fig., 1953.

At the Department of Plant Pathology, University of California, Berkeley, 21 chemicals were injected in at least three concentrations into composted soil containing standardized inoculum of *Verticillium albo-atrum* grown on tomato stem pieces placed at depths from 1½ in. to 2 ft. in 3-gal. cans [*R.A.M.*, 31, p. 35]. Results were based on recovery of the fungus from the test pieces and expressed in ml. of chemical per sq. ft. of soil required to kill the fungus to a depth of 1 ft.

Chloropicrin was effective at 2 to 2·5 ml. per sq. ft., diffusing in lethal concentration almost equally well in every direction. Allyl bromide and CBP-55 (55 per cent. chloro-bromopropene) [cf. 33, p. 49] were toxic at 2 to 3 and 4 to 5 ml., respectively, diffusing mostly downwards and sideways. The other preparations tested were ineffectual for the object in view. A reasonable measure of agreement was secured between an estimated field dosage from can tests and one actually providing efficient control of the disease in the field. For instance, the incidence of wilt in chrysanthemums was reduced from 56 to 1·04 per cent. by an application of larvacide at 3 ml. per sq. ft. (35·3 gals. per acre) and to 17·4 per cent. by CBP-55 at 4 ml. per ft. (46 gals. per acre) on the basis of marketable flower production, while the corresponding decreases gauged by the number of infected plants were from 100 to 9·1 and 76·4 per cent., respectively.

Yerkes (W. D.), Richardson (R. W.), & Herrera (O. B.). **Tomato grey mold in Papaloapan, Veracruz, Mexico.**—*Plant Dis. Reptr*, 38, 1, p. 35, 1954. [Multilithed.]

Tomato grey mould (*Cladosporium fulvum*) [C.M.I. map No. 77] was observed on field-grown tomatoes in February and March, 1953, at Papaloapan, Veracruz, Mexico. The disease was most severe on plants with a heavy set of fruit and on early varieties. Long Red, Red Jacket, and Stokescross #2 (F_2 #1) were all resistant.

Gravatt (G. F.). **Potential danger to the Persian Walnuts, Douglas-Fir, and Port Orford Cedar of the Pacific coast from the Cinnamon Phytophthora.**—*Plant Dis. Reptr*, 38, 3, pp. 214–216, 1954. [Multilithed.]

Attention is drawn to the serious consequences that might accrue if *Phytophthora cinnamomi* [*R.A.M.*, 33, p. 439] should become widely distributed in the Pacific Northwest in native stands of Douglas fir (*Pseudotsuga menziesii*) [*P. taxifolia*: 24,

p. 295], Port Orford cedar (*Chamaecyparis lawsoniana*) [32, p. 521], and Persian walnut (*Juglans regia*) [24, p. 295], all of which are highly susceptible.

Boyce (J. S.). **Nitidulid beetles released 500 feet away reinfest Oak wilt fungus mats.** —*Plant Dis. Reptr*, 38, 3, pp. 212–213, 1954. [Multilithed.]

Experiments carried out by the Southeastern Forest Experiment Station, Ashville, North Carolina, showed that marked nitidulid beetles removed from fresh mycelial mats of *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, p. 456] on a wilting oak tree returned to them from distances of 100 and 500 feet.

Griswold (C. L.). **Transmission of the Oak wilt fungus by the pomace fly.**—*J. econ. Ent.*, 46, 6, pp. 1099–1100, 1953.

In a preliminary test at Ohio Agricultural Experiment Station a wounded red oak seedling died early in July, 1953, from wilt disease (*Endoconidiophora fagacearum*) [*Chalara quercina*: see preceding abstract] following colonization with adults of *Drosophila melanogaster* [*R.A.M.*, 33, p. 188] that had previously fed and laid eggs on sporulating mats of the fungus.

Goode (M. J.). **Control of Oak leaf-blister in Mississippi.**—Abs. in *Phytopathology*, 43, 9, p. 472, 1953.

Effective control of *Taphrina caerulescens* on oaks, which had 75 to 95 per cent. infection in 1952, was secured in 1953 in Mississippi [*R.A.M.*, 31, p. 37] by a single dormant application of each of the following: 4–4–50 Bordeaux mixture, zineb, nabam, vancide 51, manzate, phygon XL, merculine, orthocide 406 [captan], cop-o-zink, microgel, and tribasic copper sulphate at standard concentrations, using power equipment for thorough coverage of the buds.

Zycha (H.) & Schmidle (A.). **Pilzkrankheiten der Pappel.** [Fungus diseases of the Poplar.]—*Flugbl. biol. Bundesanst. Braunschw.* M14, 8 pp., 5 figs., 1953.

Essential information is presented in a semi-popular form on the occurrence and control in Germany of the poplar diseases caused by *Septotinia populiperda* [see following abstracts], *Taphrina aurea* [*R.A.M.*, 16, p. 642], *Melampsora pinitorqua* [25, p. 145], *Valsa sordida* [33, p. 388], occasionally accompanied by *Cytospora nivea*, *C. harioti*, and *C.* [*V.*] *ambiens* [cf. 13, p. 244], *Dothichiza populea* [11, p. 338], *Nectria* spp. (in many cases possibly secondary to *Pseudomonas rimifaciens* [31, p. 260; 32, p. 522]), and 'brown spot scab'. The last-named, probably due in the first place to climatic extremes, especially drought, followed by bacterial or virus infection, is characterized by necrotic discoloured areas, up to the size of the palm of the hand, on the cortex of trees of ten years or older, *Populus robusta* apparently being specially susceptible. Occlusion in the ensuing growing seasons results in the raising and scaling of the bark, imparting a 'scabby' aspect to the trunk.

Felled poplar wood, unless rapidly dried, is subject to damage by lignicolous fungi, principally *Pholiota destruens* [13, p. 605], *Stereum purpureum*, and *Armillaria mellea* [cf. 32, p. 520].

Schmidle (A.). **Über eine Blattkrankheit der Pappel.** [On a leaf disease of the Poplar.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 6, pp. 81–83, 4 figs., 1953.

The fungus isolated at the Institute for Forest Mycology, Hann.-Münden, Germany, from poplar leaves bearing sharply delimited, light to dark brown spots enclosing a concentrically zonate, white layer of mycelium, is referred to *Septotinia populiperda* [see preceding and next abstracts and *R.A.M.*, 32, p. 156]. The species

reported to be affected in the Helmstedt district of Brunswick are *Populus marilandica*, *P. vernirubens*, and the 'red' form of *P. robusta*.

The conidial dimensions of *S. populiperda* are very close to those assigned by Johannes to *Septogloeum populiperdum* [loc. cit.], and the author believes the two species to be identical, more especially as both occur in the same region. It is true that the symptoms attributed to the two fungi are different but such discrepancies may be due to environmental factors, further investigations on which are planned.

Waterman (Alma M.) & Aldrich (K. F.). **Additional information on the surface sterilization of Poplar cuttings.**—*Plant Dis. Reptr*, 38, 2, pp. 96–100, 1954. [Multilithed.]

In further studies at the Division of Forest Disease Investigations, New Haven, Connecticut, a high degree of surface sterilization of poplar cuttings sprayed with a mixed spore suspension of *Septoria musiva*, *Dothichiza populca*, and *Septotinia populiperda* [*R.A.M.*, 31, p. 638 and preceding abstracts] was given by immersion for 15 to 30 minutes in 1 per cent. semesan or for 4 seconds in 2 per cent. ceresan M. The materials were non-toxic to cuttings stored for a short period before planting in the greenhouse [cf. next abstract].

Ford (H. F.) & Waterman (Alma M.). **Effect of surface sterilization on survival and growth of field planted hybrid Poplar cuttings.**—*Plant Dis. Reptr*, 38, 2, pp. 101–105, 1954. [Multilithed.]

The effect of surface sterilization on the survival and growth of hybrid poplar cuttings [see preceding abstract] was tested under conditions likely to occur in practice when cuttings treated and stored at New Haven, Connecticut, were grown in the field at Laurel, Maryland. A 20-minute immersion in 1 per cent. semesan had no appreciable phytotoxic effect and no rinsing was required before preparation for shipment; this treatment is therefore recommended. There was a higher mortality in cuttings treated with ceresan M or mercuric chloride [*R.A.M.*, 31, p. 639] and growth was poorer.

Ogawa (J. M.). **The occurrence of Hendersonula toruloidea Nattrass on Populus species in California.**—*Plant Dis. Reptr*, 38, 3, p. 238, 1954. [Multilithed.]

Hendersonula toruloidea [*R.A.M.*, 27, p. 103] was isolated from dead poplars (*Populus* ? *fremontii*) and from dead branches on living trees [cf. 14, p. 83] in Fresno county, California. The fungus also occurred on figs in the same district.

Silverborg (S. B.). **Sterile conks of Fomes igniarius on Aspen.**—*Phytopathology*, 43, 12, pp. 699–700, 1 fig., 1953.

During the summer of 1952 three black, rimose, obtuse-elongate, sterile sporophores of *Fomes igniarius*, 1 to 1½ in. in diameter, were found on the node of a branch 10 ft. from the ground of an aspen (*Populus tremuloides*) 57 ft. high and 8 in. in diameter at breast height at the Huntington Wildlife Forest, Newcomb, New York, causing a typical white heart rot [*R.A.M.*, 32, p. 520]. The fungus was identified by the characteristic odour of wintergreen from the decayed wood and cultures, other cultural features, and comparison with known isolates of the species from the same host [16, p. 715].

Bagchee (K.). **New and noteworthy diseases of trees in India. 7. Pit canker disease of Siris (Albizzia procera Benth.) due to Fusarium solani (Mart.) App. et Wr. sensu Snyder et Hansen.**—*Indian For.*, 80, 5, pp. 246–251, 2 pl., 10 figs., 1954.

During the past 15 years a severe stem canker of *Albizzia procera* has been under

observation in the New Forest Estate, Dehra Dun, Uttar Pradesh, and neighbouring tea gardens where the tree is used for shade. The canker is initiated as a result of frost damage, appearing as a long pinkish scar; four or five years later it is greyish black or black.

The canker heals up in the dry season each year and reopens in the rains. Secondary infection by bacteria, sap-stain fungi, and insects finally weakens the trunk so that it topples over. A *Fusarium* sp. [cf. *R.A.M.*, 29, p. 589; 32, p. 597] was isolated from the initial stages of the canker in 1949, 1950, 1951, and 1952. The pathogenicity of the isolates was proved by inoculation experiments. On the basis of these tests it is proposed to name the fungus *F. solani* f. *albizziae* n.f. Some trees appeared to be immune.

Carter (J. C.). **Phytophthora canker of Russian Olive.**—Abs. in *Phytopathology*, 43, 9, p. 468, 1953.

At the University of Illinois an isolate of *Phytophthora cactorum* obtained in 1945 from cankerous trunk tissue of a Russian olive [*Eleagnus angustifolia*] on the campus was inoculated into greenhouse-grown plants in 1946, 1947, 1949, 1950, and 1951. From 51 stem inoculations in April and May 40 cankers developed, ranging from 2 to 12 in. in length, three of which girdled the stems and killed the trees; the June tests gave negative results. Three to four weeks after inoculation oval to elongate, sunken areas were formed on the infected bark and the inner phloem turned brown or black. The cankers continued to enlarge until midsummer, while the discoloured streaks in the current-season springwood extended up and down the stems beyond the external visible symptoms. Amber to brown gummy deposits of sap were prominent along the margins of some cankers. The fungus could be reisolated from the diseased tissues four weeks but not from six to 21 months after inoculation.

Garren (K. H.). **Second report on leader dieback of Sweetgum.**—*Plant Dis. Reptr*, 38, 2, pp. 91–92, 1954. [Multilithed.]

Leader die-back of sweet gum (*Liquidambar styraciflua*) [*R.A.M.*, 29, p. 66] is reported from Mississippi, western Florida, South and North Carolina, the limestone valleys of the Smoky Mountains, and Middleburg, Virginia. Isolations obtained consistently from diseased material included species of *Diplodia* (60 per cent.) and *Nectria* (30 per cent.) and a black, slow-growing, non-sporulating organism (10 per cent.). In inoculation experiments in 1953 infection was obtained with *Diplodia* but not with *Nectria*. On six different sites near Auburn, Alabama, there was an abrupt decrease in disease development after 1951, probably as a result of the death, by this year, of the more severely affected younger trees. Leader die-back resembles sweet gum blight [see next abstract] in some stages and it is suggested that the two diseases may be the same, symptom differences being attributed to differences in the age of the trees or in the environment, or to both.

Young (G. Y.), Toole (E. R.), & Berry (F. H.). **Status of Sweetgum blight, 1953.**—*Plant Dis. Reptr*, 38, 2, pp. 93–95, 1954. [Multilithed.]

Blight of sweet gum (*Liquidambar styraciflua*) [*R.A.M.*, 31, p. 639 and preceding abstract], the cause of which is still unknown, increased rapidly during 1952 and 1953 in many localities in Maryland, South Carolina, Alabama, Mississippi, Arkansas, Louisiana, and Texas. It is advisable to salvage merchantable trees as soon as they become infected. Trees are unlikely to recover and may die rapidly. Dying sweet gums in shade belts should be replaced by some other species.

Cox (R. S.). **Etiology and control of a serious complex of diseases of conifer seedlings.**—Abs. in *Phytopathology*, 43, 9, p. 469, 1953.

A disease complex comprising damping-off, root rot, stem canker, and needle blight, caused primarily by *Cylindrocladium scoparium* [*R.A.M.*, 29, p. 100], has long been a limiting factor in conifer seedling production, particularly of white pine [*Pinus strobus*] and Douglas fir [*Pseudotsuga taxifolia*] at the Delaware State Nursery Forest, where losses often reach 75 to 100 per cent. A highly effective control programme has been developed, involving a pre-sowing soil treatment for the damping-off and root rot phases with 1 in 25 formalin at the rate of 1 qt. per sq. ft. or chloropicrin at 1 gal. per 1,000 sq. ft., and monthly applications to the foliage from May to September, inclusive, of Bordeaux mixture 8–8–100, manzate 1½–100, zineb 2–100, ferbam 2–100, or thiram 1½–100, all of which were efficacious against stem canker and needle blight.

Berbee (J. C.), Berbee (Flora), & Brener (W. H.). **The prevention of damping-off of coniferous seedlings by pelleting seed.**—Abs. in *Phytopathology*, 43, 9, p. 466, 1953.

Damping-off of conifer seedlings due to *Pythium irregulare* and *Rhizoctonia* [*Corticium*] *solani*, especially the latter, is responsible for heavy damage in Wisconsin [*R.A.M.*, 31, p. 640], and during the last three years 28 fungicides have been tested for its control. A single spring soil application of 75 per cent. thiram or of a 30 per cent. mixture of sodium dimethyldithiocarbamate and sodium 2-mercaptobenzothiazole, sprayed at the respective rates of 0·5 and 4 gm. per sq. ft., suppressed the post-emergence damping-off caused by *C. solani* but did not prevent pre-emergence losses. Better results were obtained by pelleting the seed with 50 per cent. thiram, using 4 per cent. methyl cellulose as a binder. Concentrations of up to 4 lb. fungicide per 1 lb. seed were non-injurious in autumn-sown beds. Pellets prepared in a pharmaceutical pill coater by mixing 3 oz. methyl cellulose, 8 oz. fungicide, and 1 lb. seed were effective against both pre- and post-emergence infection, the corresponding rates for spring seedlings being 1 and 2 oz. to 1 lb. seed.

Campbell (W. A.) & Hepting (G. H.). **Fomes annosus on Slash Pine.**—*Plant Dis. Reptr*, 38, 3, p. 217, 1954. [Multilithed.]

In 1952 *Fomes annosus* was isolated from decayed roots of diseased and wind-thrown slash pine (*Pinus elliotti*) [*P. caribaea*: cf. *R.A.M.*, 32, p. 651; 33, p. 59] in a 15-year-old plantation in the Manchester State Forest near Wedgewood, South Carolina. Deaths during the past three years in a 15- to 20-year-old natural stand near Swainsboro, Georgia are attributed to the same fungus. The disease may become serious, since many stands in the south are being thinned, thus providing conditions favourable for the spread of infection [cf. 33, p. 190].

Näslund (M.). **Statens Skogsforskningsinstitut 1902–1952.** [The State Forest Research Institute 1902–1952.]—*Medd. SkogsforsknInst., Stockh.*, 42 (*1952–1953*), 1, pp. 1–307, 72 figs., 2 graphs, 3 maps, 3 plans, 1953. [English summary, pp. 309–322.]

Chapter 4 (Department of Botany and Soils) of this comprehensive survey of the history, organization, and activities of the Swedish Forest Research Institute is contributed by C. Malmström and contains many references of phytopathological interest, among the subjects included being air-borne fungus spores, mycorrhiza, forest tree diseases, and fungal damage to timber and its prevention. Most of the more recent studies have been noticed from time to time in this *Review*.

A list of publications issued from 1939 to 1952 (part 2, pp. 1–40) and brief resumés of the work and organization in English (part 3B, pp. 1–20, 2 figs.) and German (part 3C, pp. 1–24, 2 figs.) are appended.

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ERRATA

Volume XXXIII, p. 204, line 49, *transfer* 'e.g., Vilmorin 27. . . . Fylgia,' *to next line after* 'used,'
p. 219, line 51, *for* 'healthy' *read* 'total'; line 52, *for* '6·1' *read* '6·1'; line 53, *insert* 'all' *after* 'protect'
p. 280, line 6; p. 304, lines 17–18, 33, 40; p. 305, line 5, *delete* 'cherry mottle leaf virus'
p. 304, line 17, *insert* '(Khristov)' after '*Prunus* virus 7'.

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